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# AIR POLLUTION ABSTRACTS. VOLUME 4, NUMBER 8, AUGUST, 1973, 28523-29147

Air Pollution Technical Information Center
Research Triangle Park, North Carolina

August 1973

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# AIR POLLUTION ABSTRACTS

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U.S. ENVIRONMENTAL PROTECTION AGENCY
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This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Translations are cited with their sources whenever possible. The subject fields are as follow: Emission Sources; Control Methods; Measurement Methods; Air Quality Measurements; Atmospheric Interactions; Basic Science and Technology; Effects-Human Health; Effects-Plants and Livestock; Effects-Materials; Economic Aspects; Standards and Criteria; Legal and Administrative; Social Aspects; and General and Miscellaneous. All abstracts are listed under one of the above subject fields. A subject and author index are included. This issue contains abstracts 28523 - 29147.

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# AIR POLLUTION ABSTRACTS

VOLUME 4, NO. 8 AUGUST 1973

Prepared by
Air Pollution Technical Information Center (APTIC)
Research Triangle Park, North Carolina 27711

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Personal authors are arranged alphabetically. The names are presented last name first. When the author is a primary author, an asterisk precedes the Abstract Number.

# INTRODUCTION

This periodical is intended to inform personnel of the Environmental Protection Agency (EPA), and others who are also professionally interested in air pollution, of selected technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given.

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Translations are cited with their sources whenever possible. If a translation proves to be unavailable from the source cited, or if a translation is cited without a source, it may be located through APTIC or through the National Translations Center, 35 West 33rd Street, Chicago, Illinois 60616.

The serial publications (journals, periodicals, etc.) being scanned number approximately 7,000. Approximately 1,000 of the most productive publications are listed with their publishers' addresses in our December 1972 issue. Additional copies of that list are available.

As another service, abstracts of all of the literature in APTIC (not just in a single issue of this periodical) on any subject related to air pollution will be provided free of charge upon request. APTIC can search information more recent than that in the current issue of this periodical because of the lapse of time entailed by editorial, make-up, and printing work.

More than 1400 subject index terms are available for such searching ---more than those included in the subject index in each issue.

Feedback from our users, including suggestions of articles, are always welcome.

# APTIC Publications

*Air Pollution Aspects of Emission Sources: Pulp and Paper Industry - A Bibliography With Abstracts*, March 1973, GPO No. EP 4.9:121, $2.35.

*Mercury and Air Pollution: A Bibliography with Abstracts*, October 1972, GPO No. EP 4.9:114, $1.25.

*Odors and Air Pollution: A Bibliography with Abstracts*, October 1972, GPO No. EP 4.9:113, $3.00.

*Air Pollution Aspects of Emission Sources: Petroleum Refineries - A Bibliography With Abstracts*, July 1972, GPO No. EP 4.9:110, $1.25.

*Air Pollution Aspects of Emission Sources: Iron and Steel Mills - A Bibliography With Abstracts*, May 1972, GPO No. EP 4.9:107, $1.00.

*Air Pollution Aspects of Emission Sources: Boilers - A Bibliography With Abstracts*, May 1972, GPO No. EP 4.9:105, $2.00.

*Hydrochloric Acid and Air Pollution: An Annotated Bibliography*, July 1971, GPO No. EP 4.9:100, $0.55.

*Chlorine and Air Pollution: An Annotated Bibliography*, July 1971, GPO No. EP 4.9:99, $0.55.

*Air Pollution Aspects of Emission Sources: Electric Power Production - A Bibliography With Abstracts*, May 1971, GPO No. EP 4.9:96, $2.25.

*Air Pollution Aspects of Emission Sources: Cement Manufacturing - A Bibliography With Abstracts*, May 1971, GPO No. EP 4.9:95, $0.50.

*Air Pollution Aspects of Emission Sources: Sulfuric Acid Manufacturing - A Bibliography With Abstracts*, May 1971, GPO No. EP 4.9:94, $0.65.

*Air Pollution Aspects of Emission Sources: Nitric Acid Manufacturing - A Bibliography With Abstracts*, May 1971, GPO No. EP 4.9:93, $0.45.

*Air Pollution Aspects of Emission Sources: Municipal Incineration - A Bibliography With Abstracts*, May 1971, GPO No. EP 4.9:92, $1.00.

*Photochemical Oxidants and Air Pollution: An Annotated Bibliography (2 Volumes)*, March 1971, GPO No. EP 4.9:88, $6.25.

*Beryllium and Air Pollution: An Annotated Bibliography*, February 1971, GPO No. EP 4.9:83, $0.40.

*Asbestos and Air Pollution: An Annotated Bibliography*, February 1971, GPO No. EP 4.9:82, $0.50.

*Municipal Incineration: A Review of Literature*, June 1971, GPO No. EP 4.9:79, $1.00.

*Hydrocarbons and Air Pollution: An Annotated Bibliography (2 Volumes)*, October 1970, GPO No. HE 20.1309:75, $5.00.

*Nitrogen Oxides: An Annotated Bibliography*, August 1970, GPO No. HE 20.1309:72, $2.75.

*Air Pollution Translations: A Bibliography With Abstracts Volume I*, May 1969, GPO No. FS 2.93/3:56, $1.75.

*Air Pollution Translations: A Bibliography With Abstracts Volume II*, April 1970, GPO No. HE 20.1309:69, $1.00.

*Carbon Monoxide, A Bibliography With Abstracts*. 1966, GPO No. PHS 1503, $2.50.

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# RECENT CONTRACT AWARDS

from the

## Durham Contract Operations
## Contracts Management Division, EPA

**Contract No. 68-02-0571,** Modification No. 4.................................................... *$160,928*
COMMUNITY STUDY PROJECT ON THE EFFECTS OF PESTICIDES USE ON PUBLIC HEALTH.
Utah State Department of Social Services, Division of Health, 44 Medical Drive, Salt Lake City, Utah 84113

**Contract No. 68-02-1236,** RFP No. Du-73-B424 .................................................... *$87,337*
DEVELOPMENT OF METHODOLOGY FOR CHARACTERISTICS OF EMISSION FROM AIRCRAFT SOURCES.
Airesearch Manufacturing Company of Arizona, Inc., A Division of the Garrett Corporation, 402 South 36th Street, Phoenix, Arizona 85035

**Contract No. 68-02-1232,** RFP No. Du-73-B345 .................................................... *$106,042*
MEASUREMENT OF LIGHT HYDROCARBONS IN THE FIELD AND STUDIES OF TRANSPORT OF OXIDANT BEYOND URBAN AREAS.
Washington State University, Engineering Research Division, Pullman, Washington 99163

**Contract No. 68-02-1335,** RFP No. Du-73-A031 .................................................... *$252,770*
PILOT PLANT DESIGN OF A PYRITIC SULFUR REMOVAL PROCESS.
TRW, Inc., One Space Park, Redondo Beach, California 90278

**Contract No. 68-02-1092,** RFP No. Du-73-A179 .................................................... *$244,451*
AN INVESTIGATION OF AERODYNAMIC PHENOMENA IN THE CONTROL OF POLLUTANTS FROM COMBUSTION PROCESSES.
United Aircraft Research Laboratories, 400 Main Street, East Hartford, Connecticut 06108

**Contract No. 68-02-1370,** RFP No. Du-73-A156 .................................................... *$380,000*
DEVELOPMENT OF TECHNOLOGY FOR CONTROL OF BOP CHARGING EMISSIONS.
National Steel Corporation, P. O. Box 431, Weirton, West Virginia 26063

**Contract No. 68-02-1010,** Modification No. 1 .................................................... *$199,500*
WET COLLECTED LIMESTONE, MODIFIED FLY ASH CHARACTERIZATION AND EVALUATION OF POTENTIALLY TOXIC HAZARDS.
Aerospace Corporation, P. O. Box 95085, Los Angeles, California 90045

**Contract No. 68-02-1358,** RFP No. Du-73-A085 .................................................... *$112,591*
STUDY OF EMISSIONS FROM PROCESSES PRODUCING CLEAN ENERGY FROM FOSSIL FUELS.
Booz-Allen Public Administration, Inc., 4733 Bethesda Avenue, Bethesda, Maryland 20014

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**Contract No. 68-02-0292,** Modification No. 3 .................... *$44,000*
CATALYTIC REDUCTION OF NOx IN SULFUR-FREE COMBUSTION FLUE GASES WITH AMMONIA PILOT PLANT OPERATION.
Environics, Inc., 7424 Lorge Circle, Huntington Beach, California 92646

**Contract No. 68-02-1003,** RFP No. Du-73-A212 .................... *$55,929*
RESIDENTIAL AND COMMERCIAL INSTITUTIONAL AREA SOURCE EMISSIONS METHODOLOGY AND INVENTORY FOR THE REGIONAL AIR POLLUTION STUDY (RAPS) PROGRAM.
Environmental Engineering, Inc., 2324 S. W. 34th Street, Gainesville, Florida 32601

**Contract No. 68-02-1341,** RFP No. Du-73-A126 .................... *$123,621*
FINE PARTICULATE MEASURING DEVICE.
GCA Corporation, Bedford, Massachusetts 01730

**Contract No. 68-02-1312,** RFP No. Du-72-A242 .................... *$698,038*
SHAKEDOWN AND COMMISSIONING RUNS OF HIGH TEMPERATURE FLUIDIZED BED COMBUSTION-LIMESTONE REGENERATION UNIT BEING CONSTRUCTED UNDER CONTRACT NO. 68-02-0617.
Esso Research and Engineering Company, P. O. Box 8, Linden, New Jersey 07036

**Contract No. 68-02-1353,** RFP No. Du-73-A111 .................... *$41,375*
STUDY OF PARTICLE CONTROL TECHNOLOGY FOR ENCLOSED ASBESTOS EMISSIONS.
IIT Research Institute, 10 West 35th Street, Chicago, Illinois 60616

**Contract No. 68-02-1347,** RFP No. Du-73-A046 .................... *$350,000*
EMISSION TESTING AND EVALUATION OF THE ENCLOSED COKE PUSHING AND QUENCHING SYSTEM CONSTRUCTED PURSUANT TO CONTRACT NO. 68-02-0622.
National Steel Corporation, Weirton Steel Division, P. O. Box 431, Weirton, West Virginia 26062

**Contract No. 68-02-1362,** RFP No. Du-73-A028 .................... *$140,816*
ENGINEERING EVALUATIONS OF THE MOLTEN-IRON GASIFICATION PROCESS.
J. F. Pritchard and Company, 4625 Roanoke Parkway, Kansas City, Missouri 64112

**Contract No. 68-02-1360,** RFP No. Du-73-A176 .................... *$243,707*
DESIGN CRITERIA FOR THE CONTROL OF NOx AND COMBUSTIBLE EMISSIONS THRU COMBUSTION MODIFICATION IN GAS FIRED SYSTEMS.
Institute of Gas Technology, 3424 South State Street, IIT Center, Chicago, Illinois 60616

**Contract No. 68-02-0255,** Modification No. 3 .................... *$78,501*
IN-DEPTH STUDIES OF PETROCHEMICAL PROCESSES.
Air Products and Chemicals, Inc., P. O. Box 427, Marcus Hook, Pennsylvania 19061

**Contract No. 68-02-1313,** RFP No. Du-73-A164 .................... *$121,670*
WET PRECIPITATOR TECHNOLOGY AND JOINT COLLECTION.
Southern Research Institute, 2000 Ninth Avenue South, Birmingham, Alabama 35205

**Contract No. 68-02-1336,** RFP No. Du-73-A023 .................... *$355,250*
BENCH SCALE DEVELOPMENT OF PROCEDURES FOR THE CHEMICAL EXTRACTION OF PYRITIC AND ORGANIC SULFUR FROM COAL.
TRW, Inc., One Space Park, Redondo Beach, California 90278

**Contract No. 68-02-1340,** RFP No. Du-73-A143 .................................................. *$30,000*
ANNOTATED DIRECTORY OF INSTRUCTIONAL MATERIALS AND RESOURCES IN THE FIELD OF AIR POLLUTION CONTROL.
The Ohio State University Research Foundation, 1314 Kinnear Road, Columbus, Ohio 43212

**Contract No. 68-02-1309,** RFP No. Du-73-A128 .................................................. *$74,627*
DEVELOPMENT OF A DROPLET SIZING INSTRUMENT FOR EVALUATION OF SCRUBBING SYSTEMS.
KLD Associates, Inc., Suite 204, 7 High Street, Huntington, N. Y. 11743

**Contract No. 68-02-1087,** RFP No. Du-73-A049 .................................................. *$60,000*
INVESTIGATION OF ODOR CONTROL IN THE RENDERING INDUSTRY.
Fats and Proteins Research Foundation, Inc., 2720 Des Plaines Avenue, Des Plaines, Illinois 60019

**Contract No. 68-02-0631,** Modification No. 2 .................................................. *$104,500*
STUDIES OF SO2 WET SCRUBBING UTILIZING EPA RESEARCH MODEL SCRUBBER.
Monsanto Research Corporation, Dayton Laboratory, 1515 Nicholas Road, Dayton, Ohio 45407

**Contract No. 68-02-1346,** RFP No. Du-73-A194 .................................................. *$48,544*
A STUDY OF ASBESTOS CONCENTRATIONS IN THE AIR MEASURED INSIDE AND OUTSIDE OF BUILDINGS.
Mount Sinai School of Medicine of the City University of New York, Fifth Avenue and 100 Street, New York, New York 10029

**Contract No. 68-02-1310,** RFP No. Du-73-A093 .................................................. *$49,983*
INVARIANT MODELING OF ATMOSPHERIC TURBULENCE AND DIFFUSION.
Aeronautical Research Associates of Princeton, 50 Washington Road, Princeton, New Jersey 08540

**Contract No. 68-02-1306,** RFP No. Du-73-A058 .................................................. *$94,291*
PROCEDURES FOR MEASUREMENTS IN STRATIFIED GASES.
Walden Research Division of Abcor, Inc., 359 Allston Street, Cambridge, Massachusetts 02139

**Contract No. 68-02-1091,** RFP No. Du-73-A077 .................................................. *$184,908*
AIR POLLUTION TECHNOLOGY AND COSTS IN SELECTED INDUSTRIES.
Industrial Gas Cleaning Institute, Inc., Post Office Box 1333, Stamford, Connecticut 06904

**Contract No. 68-02-0273,** Modification No. 3 .................................................. *$60,873*
PARTICLE SIZING TECHNIQUES FOR CONTROL DEVICE EVALUATION.
Southern Research Institute, 2000 Ninth Avenue, Birmingham, Alabama 35205

**Contract No. 68-02-0265,** Modification No. 1 .................................................. *$98,893*
ELECTROSTATIC PRECIPITATOR PERFORMANCE MODEL.
Southern Research Institute, Birmingham, Alabama 35205

**Contract No. 68-02-1352,** RFP No. Du-73-A178 .................................................. *$50,000*
AN INTERPRETATIVE COMPILATION OF EPA STUDIES RELATED TO COAL QUALITY AND CLEANABILITY.
The Mitre Corporation, Westgate Research Park, McLean, Virginia 22101

**Contract No. 68-02-1503,** RFP No. Du-73-C898 ........ *$78,844*
MODEL MULTIBURNER COMBUSTOR.
Aerotherm Division, Acurex Corporation, 485 Clyde Avenue, Mountain View, California 99040

**Contract No. 68-02-1099,** RFP No. Du-73-A047 ........ *$228,231*
TECHNICAL ECONOMIC STUDY OF FUEL GAS ENVIRONMENTAL IMPACT.
United Aircraft Corporation, Research Laboratories, 400 Main Street, East Hartford, Connecticut 06108

**Contract No. 68-02-1097,** RFP No. Du-73-A035 ........ *$160,290*
ASSESSMENT AND DEVELOPMENT OF CONTROL TECHNOLOGY APPLICABLE TO REMOVAL OF MERCURY FROM SO2 BEARING WASTE GASES.
Midwest Research Institute, 425 Volker Boulevard, Kansas City, Missouri 64110

**Contract No. 68-02-1308,** RFP No. Du-73-A133 ........ *$985,620*
QUICK-REACTION, NON-PERSONAL, ENGINEERING AND TECHNICAL SERVICES.
The M. W. Kellogg Company, 1300 Three Greenway Plaza East, Houston, Texas 77046

**Contract No. 68-02-0611,** Modification No. 5 ........ *$87,232*
ENGINEERING STUDIES OF CONTROL OF AIR POLLUTION FROM STATIONARY SOURCES.
Battelle Memorial Institute, 505 King Avenue, Columbus, Ohio 43201

**Contract No. 68-02-1334,** RFP No. Du-73-A094 ........ *$60,590*
COURSE MANUAL REVISION AND UPDATE.
Pacific Environmental Services, Incorporated, 2932 Wilshire Boulevard, Santa Monica, California 90403

**Contract No. 68-02-1345,** RFP No. Du-73-A162 ........ *$116,544*
APPLICATION OF CHARGED DROPLET SCRUBBING TO FINE PARTICLE CONTROL.
TRW Inc., One Space Park, Redondo Beach, California 90278

**Contract No. 68-02-1368,** RFP No. Du-73-A233 ........ *$1,719,350*
CONTINUED DEVELOPMENT OF THE MOLTEN IRON COAL GASIFIER.
Applied Technology Corporation, 135 Delta Drive, Pittsburgh, Pennsylvania

**Contract No. 68-02-1348,** RFP No. Du-73-A061 ........ *$227,300*
CHARACTERIZATION AND CONTROL OF ASBESTOS EMISSIONS FROM OPEN MINE FACES, DUMPS, AND STORAGE AREAS.
IIT Research Institute, 10 West 35th Street, Chicago, Illinois 60616

**Contract No. 68-02-1366,** RFP No. Du-73-A158 ........ *$185,230.77*
CONVERSION OF COAL TO LOW-SULFUR FUEL.
Institute of Gas Technology, 3424 South State Street, Chicago, Illinois 60616

**Contract No. 68-02-1527,** RFP No. Du-73-C928 ........ *$30,500*
TECHNICAL SERVICES PERTINENT TO THE OPERATOR OF BENDIX NOx ANALYZERS.
Bendix Corporation, Process Instruments Division, Post Office Box 477, Ronceverte, West Virginia 24970

**Contract No. 68-02-1525,** RFP No. Du-73-C855 .................................................. *$60,343*
DATA ACQUISITION AND CONTROL SYSTEM TO INCLUDE MAINTENANCE.
Digital Equipment Corporation, Executive Park, 3700 Chapel Hill Boulevard, Durham, North Carolina 27707

**Contract No. 68-02-1505,** RFP No. Du-73-C795 .................................................. *$37,660*
BASIC ENVIRONMENTAL STATISTICS PACKAGED COURSE.
Applied Science Associates, Incorporated, Box 158, Valencia, Pennsylvania 16059

**Contract No. 68-02-1532,** RFP No. Du-73-C945 .................................................. *$51,095*
ELECTRON SPIN RESONANCE SPECTROMETER.
Varian/Instrument Division, 4701 Lydell Drive, Cheverly, Maryland 20781

**Contract No. 68-02-1371,** RFP No. Du-73-A250 .................................................. *$74,418*
EMISSION AND AIR QUALITY TREND MONITORING AND REPORT PREPARATION.
Teknekron, Inc., 1619 Massachusetts Avenue, N. W., Washington, D. C. 20036

**Contract No. 68-02-1318,** RFP No. Du-73-A124 .................................................. *$992,000*
QUICK REACTION ENGINEERING AND TECHNICAL SERVICES.
Acurex Corporation, Aerotherm Division, 485 Clyde Avenue, Mountain View, California 94040 (NOTE: This contract contains options)

**Contract No. 68-02-1319,** RFP No. Du-73-A124 .................................................. *$661,256*
QUICK REACTION ENGINEERING AND TECHNICAL SERVICES.
Radian Corporation, 8500 Shoal Creek Boulevard, Post Office Box 9948, Austin, Texas 78766 (NOTE: This contract contains options)

**Contract No. 68-02-1324,** RFP No. Du-73-A124 .................................................. *$740,280*
QUICK REACTION ENGINEERING AND TECHNICAL SERVICES.
Midwest Research Institute, 425 Volker Blvd., Kansas City, Missouri 64110 (NOTE: This contract contains options)

**Contract No. 68-02-1329,** RFP No. Du-73-A124 .................................................. *$813,905*
QUICK REACTION ENGINEERING AND TECHNICAL SERVICES.
The Dow Chemical Company, Midland, Michigan 48640 (NOTE: This contract contains options)

**Contract No. 68-02-1321,** RFP No. Du-73-A124 .................................................. *$632,989*
QUICK REACTION ENGINEERING AND TECHNICAL SERVICES.
PEDCo-Environmental Specialists, Inc., Suite 8, Atkinson Square, Cincinnati, Ohio 45246 (NOTE: This contract contains options)

**Contract No. 68-02-1328,** RFP No. Du-73-A124 .................................................. *$682,217*
QUICK REACTION ENGINEERING AND TECHNICAL SERVICES.
A. P. T., Incorporated, Post Office Box 71, Riverside, California 92502 (NOTE: This contract contains options)

**Contract No. 68-02-1331,** RFP No. Du-73-A124 .................................................. *$743,008*
QUICK REACTION ENGINEERING AND TECHNICAL SERVICES.
Lockheed Missiles and Space Company, Huntsville Research and Engineering Center, Post Office Box 1103 West Station, Huntsville, Alabama 35807 (NOTE: This contract contains options)

**Contract No. 68-02-1325,** RFP No. Du-73-A124 .......... *$678,125*
QUICK REACTION ENGINEERING AND TECHNICAL SERVICES.
Research Triangle Institute, Post Office Box 12194, Research Triangle Park, North Carolina 27709 (NOTE: This contract contains options)

**Contract No. 68-02-1320,** RFP No. Du-73-A124 .......... *$902,861*
QUICK REACTION ENGINEERING AND TECHNICAL SERVICES.
Monsanto Research Corporation, Dayton Laboratory , Dayton, Ohio 45407 (NOTE: This contract contains options)

**Contract No. 68-02-1322,** RFP No. Du-73-A124 .......... *$471,324*
QUICK REACTION ENGINEERING AND TECHNICAL SERVICES.
Catalytic, Inc., 4601 Park Road, Post Office Box 11402, Charlotte, North Carolina 38309 (NOTE: This contract contains options)

**Contract No. 68-02-1330,** RFP No. Du-73-A124 .......... *$568,292*
QUICK REACTION ENGINEERING AND TECHNICAL SERVICES.
Environmental Engineering, Incorporated, 2324 S. W. 34th Street, Gainesville, Florida 32601 (NOTE: This contract contains options)

**Contract No. 68-02-1316,** RFP No. Du-73-A124 .......... *$450,000*
QUICK REACTION ENGINEERING AND TECHNICAL SERVICES.
GCA Technology Division, A Division of GCA Corporation, Bedford, Massachusetts 01730 (NOTE: Contract contains options in the amount of $750,000)

**Contract No. 68-02-1317,** RFP No. Du-73-A124 .......... *$571,485*
QUICK REACTION ENGINEERING AND TECHNICAL SERVICES.
University of Dayton, 300 College Park Avenue, Dayton, Ohio 45469 (NOTE: This contract contains options)

**Contract No. 68-02-1327,** RFP No. Du-73-A124 .......... *$22,004*
QUICK REACTION ENGINEERING AND TECHNICAL SERVICES.
Intertechnology Corporation, Box 340, Warrenton, Virginia 22186 (NOTE: Contract contains options in the amount of $660,120)

**Contract No. 68-02-1332,** RFP No. Du-73-A124 .......... *$26,553*
QUICK REACTION ENGINEERING AND TECHNICAL SERVICES.
Arthur D. Little, Inc., 20 Acorn Park, Cambridge, Massachusetts 02140 (NOTE: Contract contains options in the amount of $796,590)

**Contract No. 68-02-1323,** RFP No. Du-73-A124 .......... *$30,800*
QUICK REACTION ENGINEERING AND TECHNICAL SERVICES.
Battelle Memorial Institute, 505 King Avenue, Columbus, Ohio 43201 (NOTE: Contract contains options in the amount of $893,200)

**Contract No. 68-02-0696,** RFP No. Du-73-B513 .......... *$28,434*
SCREENING, CATALOGING, AND ABSTRACTING OF BIO-MEDICAL JAPANESE AIR POLLUTION LITERATURE, PUBLISHED AND UNPUBLISHED IN JAPAN.
The Franklin Institute, Twentieth and Benjamin Franklin Parkway, Philadelphia, Pennsylvania 19103

**Contract No. 68-02-1311,** RFP No. Du-73-A084 .................................... *$54,849*

STUDY OF EMISSIONS AND CONTROL TECHNIQUES IN THE GASOLINE DISTRIBUTION INDUSTRY.

Parker-Hannifin Corporation, 18321 Jamboree Boulevard, Irvine, California 92664

**Contract No. 68-02-1365,** RFP No. Du-73-A175 .................................... *$306,201*

DEMONSTRATION OF MECHANICAL COOLING DEVICES FOR SALT WATER.

Environmental Systems Corporation, Post Office Box 2525, Knoxville, Tennessee 37901

**Contract No. 68-02-1344,** RFP No. Du-73-A095 .................................... *$69,684*

HANDBOOK AND SELF-INSTRUCTIONAL TRAINING PACKAGE ON EFFECTS OF AIR POLLUTION ON VEGETATION.

Applied Science Associates, Inc., Box 158, Valencia, Pennsylvania 16059

**Contract No. 68-02-1534,** RFP No. Du-73-C941 .................................... *$65,920*

PROVIDE KEYPUNCH SERVICES AND VERIFICATION OF DATA CARDS.

Data Services, Inc., 2623 Chapel Hill Boulevard, Durham, North Carolina 27707

**Contract No. 68-02-1361,** RFP No. Du-73-A040 .................................... *$216,837*

DESIGN OF A FURNACE FOR BURNING THE FUEL GAS FROM THE MOLTEN-IRON COAL GASIFICATION PROCESS.

Ultrasystems, Inc., Environmental and Applied Science Division, 2400 Michelson Drive, Irvine, California 92664.

**Contract No. 68-02-1364,** RFP No. Du-73-A159 .................................... *$177,000*

SINTER PLANT WIND BOX GAS RECYCLE SYSTEM DEMONSTRATION.

National Steel Corporation, Great Lakes Steel Division, Ecorse, Michigan 48229

**Contract No. 68-02-1363,** RFP No. Du-73-A157 .................................... *$158,000*

COLLABORATIVE TESTING OF METHODS FOR MEASUREMENT FOR NO2 IN AMBIENT AIR.

Midwest Research Institute, 425 Volker Boulevard, Kansas City, Missouri 64110

**Contract No. 68-02-1333,** RFP No. Du-73-A155 .................................... *$409,000*

DEVELOPMENT OF A PROCESS FOR PRODUCING CLEAN, HIGH TEMPERATURE, LOW BTU FUEL GAS FROM BITUMINOUS COALS.

Consolidation Coal Company, Research Division, Library, Pennsylvania 15129

**Contract No. 68-02-0607,** Modification No. 7 .................................... *$135,251*

ENGINEERING STUDIES OF CONTROL OF AIR POLLUTION FROM STATIONARY SOURCES.

Research Triangle Institute, P. O. Box 12194, Research Triangle Park, North Carolina 27709

**Contract No. 68-02-1006,** Task Order No. 3 .................................... *$46,000*

DEVELOPMENT OF HYDROCARBON EMISSION INVENTORY FOR THE METROPOLITAN BOSTON INTRASTATE AIR QUALITY CONTROL REGION.

GCA Corporation, Bedford, Massachusetts

**Contract No. 68-02-1186,** RFP No. Du-73-C793 .................................... *$165,000*

FURNISH, DELIVER, INSTALL AND CHECK OUT ONE (1) WIND TUNNEL AT THE RESEARCH TRIANGLE PARK, NORTH CAROLINA AREA.

Aerolab Supply Company, 3411 Chatham Road, Hyattsville, Maryland 20783

**Contract No. 68-02-1228,** RFP No. Du-73-B381 .................................................. *$78,578*
DEVELOPMENT OF METHOD FOR THE COLLECTION AND ANALYSIS OF CARCINOGENIC VAPORS IN AMBIENT ATMOSPHERES.
Research Triangle Institute, P. O. Box 12194, Research Triangle Park, North Carolina 27709

**Contract No. 68-02-1238,** RFP No. Du-73-B416 .................................................. *$26,852*
SECOND GENERATION PHOTOCHEMICAL MODELING.
JRB Associates, Inc., 1250 Prospect Street, La Jolla, California 92037

**Contract No. 68-02-1098,** RFP No. Du-73-A078 .................................................. *$293,000*
COLLABORATIVE TESTING SERVICES FOR STANDARDIZATION OF STATIONARY SOURCE AIR POLLUTION EMISSION MEASUREMENT METHODS.
Midwest Research Institute, 425 Volker Boulevard, Kansas City, Missouri 64110

**Contract No. 68-02-1255,** RFP No. Du-73-B395 .................................................. *$86,850*
DEVELOPMENT OF SAMPLING PROCEDURES FOR POLYCYCLIC ORGANIC MATTER (POM) AND POLYCHLORINATED BIPHENYLS (PCB).
Langston Laboratories, 3000 West 135th Street, Leawood, Kansas 66209

**Contract No. 68-02-1350,** RFP No. Du-73-A117 .................................................. *$77,473*
SOURCE INVENTORY AND EMISSION FACTOR ANALYSIS.
PEDCo-Environmental, Suite 8, Atkinson Square, Cincinnati, Ohio 45246

**Contract No. 68-02-1314,** RFP No. Du-73-A045 .................................................. *$90,858*
DEMONSTRATION OF REDUCED HYDROCARBON EMISSIONS FROM GASOLINE LOADING TERMINALS.
American Oil Company, 2500 New York Avenue, Whiting, Indiana 46394

**Contract No. 68-02-1156,** RFP No. Du-73-C804 .................................................. *$153,820*
ANALYZER, MULTIPLE-CRYSTAL X-RAY FLUORESCENCE, X-RAY GENERATOR.
Siemens Corporation, 186 Wood Avenue South, Iselie, New Jersey 08830

**Contract No. 68-02-1243,** RFP No. Du-73-B375 .................................................. *$108,377*
BIOLOGICAL EFFECTS OF TRACE SUBSTANCES AND TOBACCO SMOKE IN INTERACTION WITH NITROGEN OXIDES.
Stanford Research Institute, Menlo Park, California 94025

**Contract No. 68-02-0552,** Modification No. 3 .................................................. *$160,000*
COMMUNITY STUDY PROJECT ON THE EFFECTS OF PESTICIDES USE ON PUBLIC HEALTH.
State of Idaho, Department of Environmental and Community Services, Statehouse, Boise, Idaho 83707

**Contract No. 68-02-0560,** RFP No. Du-73-B391 .................................................. *$291,500*
PESTICIDE COMMUNITY STUDY PROJECT FOR STATE OF HAWAII.
University of Hawaii, 2044 Dole Avenue, Honolulu, Hawaii 96822

**Contract No. 68-02-1204,** RFP No. Du-73-B377 .................................................. *$59,541*
EXPOSURE OF TISSUE CULTURE SYSTEMS TO AIR POLLUTANTS UNDER CONDITIONS SIMULATING PHYSIOLOGIC STATES OF LUNG AND CONJUNCTIVA.
The Regents of the University of California, University of California, Irvine, Irvine, California 92664

**Contract No. 68-02-0629,** Modification No. 2 .......... *$199,850*
CONTROL OF POLLUTANTS IN FOSSIL FUEL CONVERSION/TREATMENT PROCESSES.
Esso Research and Engineering Company, Post Office Box 8, Linden, New Jersey 07036

**Contract No. 68-02-1233,** RFP No. Du-73-B443 .......... *$47,917*
HIGHWAY AIR POLLUTION MEASUREMENT PROGRAM.
ESL Incorporated, 495 Java Drive, Sunnyvale, California 94086

**Contract No. 68-02-1242,** RFP No. Du-73-B487 .......... *$24,242*
CONCEPTS FOR DEVELOPMENT OF FIELD USABLE TEST ATMOSPHERE GENERATING DEVICE.
Research Triangle Institute, P. O. Box 12194, Research Triangle Park, North Carolina 27709

**Contract No. 68-02-1302,** RFP No. Du-73-A055 .......... *$94,792*
CONCEPTUAL DESIGN AND ECONOMIC SENSITIVITY ANALYSES OF A COMMERCIAL SCALE PYRITIC SULFUR REMOVAL PROCESS.
The Dow Chemical Company, Contract Research and Development, Building 566, Midland, Michigan 48640

**Contract No. 68-02-1231,** RFP No. Du-73-B420 .......... *$33,020*
STUDY OF AEROSOL FORMATION IN PHOTOCHEMICAL AIR POLLUTION.
Calspan Corporation, Post Office Box 235, Buffalo, New York 14221 (NOTE: This contract contains an option for an additional twelve (12) months in the amount of $33,334)

**Contract No. 68-02-1219,** RFP No. Du-73-B412 .......... *$89,500*
DEVELOPMENT OF MANUAL SAMPLING PROCEDURES FOR PARTICULATE HAZARDOUS POLLUTANTS AND A TESTING PROGRAM FOR FILTER EFFICIENCY.
Arthur D. Little, Inc., Acorn Park, Cambridge, Massachusetts 02140

**Contract No. 68-02-1229,** RFP No. Du-73-B442 .......... *$73,125*
FIELD STUDY OF IN-STACK TRANSMISSOMETER MEASUREMENT OF PARTICULATE OPACITY AND MASS CONCENTRATION.
Philco-Ford Corporation, Aeronutronic Division, Ford Road, Newport Beach, California 92663

**Contract No. 68-02-1208,** RFP No. Du-73-B386 .......... *$39,706*
INFRARED SENSOR FOR THE REMOTE MONITORING OF SO2.
JRB Associates, Inc., 1250 Prospect Street, La Jolla, California 92307

**Contract No. 68-02-0647,** Modification No. 1 .......... *$160,168*
SURVEY OF MEYERS' PROCESS FOR DESULFURIZATION OF U. S. COALS.
TRW, Incorporated, TRW Systems Group, One Space Park, Redondo Beach, California 90278

**Contract No. 68-02-1240,** RFP No. Du-73-B508 .......... *$98,190*
TRIANGLE UNIVERSITIES CONSORTIUM ON AIR POLLUTION.
University of North Carolina, Office of Research Administration, South Building, Chapel Hill, North Carolina 27514

**Contract No. 68-02-1246,** RFP No. Du-73-B485 .......... *$39,000*
APPLICATION OF ODOR TECHNOLOGY TO MOBILE SOURCE EMISSIONS.
Arthur D. Little, Inc., Acorn Park, Cambridge, Massachusetts 02140

**Contract No. 68-02-1230,** RFP No. Du-73-B428 .................................................. *$171,236*
DEVELOPMENT OF METHODOLOGY FOR DETERMINATION OF THE EFFECTS OF DIESEL FUEL AND FUEL ADDITIVES ON PARTICULATE EMISSIONS.
Southwest Research Institute, 8500 Culebra Road, San Antonio, Texas 78284

**Contract No. 68-02-1342,** RFP No. Du-73-A054 .................................................. *$43,720*
DETERMINE RELIABILITY OF INTERMITTENT CONTROL SYSTEMS.
Environmental Research and Technology, Inc., 429 Marrett Road, Lexington, Massachusetts 02173

**Contract No. 68-02-1234,** RFP No. Du-73-B446 .................................................. *$70,000*
DEVELOPMENT OF GUIDELINES FOR QUALITY ASSURANCE PROGRAMS FOR SEVEN SOURCE EMISSION CHARACTERIZATION TECHNIQUES.
Research Triangle Institute, Post Office Box 12194, Research Triangle Park, North Carolina 27709

**Contract No. 68-02-1315,** RFP No. Du-73-A097 .................................................. *$44,995*
FUEL-BURNING EQUIPMENT SIMULATION.
Applied Science Associates, Inc., Post Office Box 158, Valencia, Pennsylvania 16059

**Contract No. 68-02-1221,** RFP No. Du-73-B379 .................................................. *$58,296*
PROCUREMENT AND PREPARATION OF AIRBORNE CARCINOGENS.
Pressure Chemical Company, 3419-25 Smallman Street, Pittsburgh, Pennsylvania 15201

**Contract No. 68-02-1227,** RFP No. Du-73-B394 .................................................. *$48,989*
INSTRUMENTATION FOR THE CONTINUOUS MONITORING OF METHANE, CARBON MONOXIDE, CARBON DIOXIDE, NITRIC OXIDE, AND ETHYLENE.
Philco Ford Corporation, Aeronautic Division, Ford Road, Newport Beach, California 92663

**Contract No. 68-02-1214,** RFP No. Du-73-B414 .................................................. *$58,119*
DESIGN, DEVELOP AND BUILD DILUTER FOR MISCELLANEOUS PARTICULATE EMISSIONS.
Environmental Research Corporation, 3725 North Dunlap Street, St. Paul, Minnesota 55112

**Contract No. 68-02-1225,** RFP No. Du-73-B479 .................................................. *$37,230*
DEVELOPMENT OF SYSTEM TO MEASURE NO2 BY LASER INDUCED FLUORESCENCE.
The Aerospace Corporation, Post Office Box 92957, Los Angeles, California 90009

**Contract No. 68-02-1096,** RFP No. Du-73-A052 .................................................. *$60,200*
TECHNICAL ANALYSES AND REPORTS PREPARATION.
Research Triangle Institute, P. O. Box 12194, Research Triangle Park, North Carolina 27709 (NOTE: This contract contains options in the amount of $125,300)

**Contract No. 68-02-1244,** RFP No. Du-73-B410 .................................................. *$61,028*
PARTICULATE SAMPLING STRATEGIES FOR MECHANICALLY DISTRIBUTED AND CYCLONIC FLOW.
Fluidyne Research Corporation, 5900 Olson Memorial Highway, Minneapolis, Minnesota 55422 (NOTE: Contract contains an additional twelve (12) month optional effort with a value of $65,474)

**Contract No. 68-02-1307,** RFP No. Du-73-A063 .................................................. *$75,000*
FATE OF POLLUTANTS IN GASIFICATION.
Institute of Gas Technology, IIT Center, 3424 South State Street, Chicago, Illinois 60616 (NOTE: Contract contains options in the amount of $24,504)

**Contract No. 68-02-1337,** RFP No. Du-73-A086 ................................................ *$164,331*
TECHNICAL STUDIES ON POLLUTANT STRATEGIES AND PROVISION OF CONSULTATION ON A RAPID RESPONSE BASIS.
GCA Corporation, GCA Technology Division, Bedford, Massachusetts 01730 (NOTE: Contract contains options in the amount $21,912)

**Contract No. 68-02-1094,** RFP No. Du-73-A052 ................................................ *$67,610*
TECHNICAL ANALYSES AND REPORTS PREPARATION.
Geomet, Incorporated, 50 Monroe Street, Rockville, Maryland 20850 (NOTE: Contract contains options in the amount of $135,774)

**Contract No. 68-02-1095,** RFP No. Du-73-A052 ................................................ *$38,376*
TECHNICAL ANALYSES AND REPORTS PREPARATION.
Computer Science Corporation, 8728 Colesville Road, Silver Spring, Maryland 20910 (NOTE: Contract contains options in the amount of $74,530)

**Contract No. 68-02-1367,** RFP No. Du-73-A145 ................................................ *$414,842*
PILOT SCALE FIELD TEST PROGRAM TO STUDY METHODS FOR REDUCTION OF NOx FORMATION IN TANGENTIALLY COAL FIRED STEAM GENERATING UNITS.
Combustion Engineering, Inc., 1000 Prospect Hill Road, Windsor, Connecticut 06095 (NOTE: Contract contains options in the amount of $29,124)

**Contract No. 68-02-1303,** RFP No. Du-73-A177 ................................................ *$86,334*
FLYASH CONDITIONING DEVELOPMENT.
Southern Research Institute, 2000 Ninth Avenue South, Birmingham, Alabama 35205 (NOTE: Contract contains options in the amount of $123,207)

**Contract No. 68-02-1237,** RFP No. Du-73-B416 ................................................ *$72,129*
SECOND GENERATION PHOTOCHEMICAL MODELING.
Systems Applications, Inc., 9418 Wilshire Boulevard, Beverly Hills, California 90212 (NOTE: Contract contains an additional twelve (12) month effort with a value of $140,615)

**Contract No. 68-02-1226,** RFP No. Du-73-B370 ................................................ *$293,000*
PREPARATION OF BACKGROUND DOCUMENTS ON ENVIRONMENTAL POLLUTANTS.
National Academy of Sciences, 2101 Constitution Avenue, Washington, D. C. 20148 (NOTE: Contract contains two (2) twelve (12) month options with a value of $311,000 and $320,000 respectively)

**Contract No. 68-02-1210,** RFP No. Du-73-B393 ................................................ *$54,978*
REVIEW OF CADMIUM TOXICITY.
The Karolinska Institute, Department of Environmental Hygiene, S-10401, Stockholm 60, Sweden

**Contract No. 68-02-0759,** RFP No. Du-72-B489 ................................................ *$796,126*
CALIBRATION AND MAINTENANCE OF CHAMP AIR MONITORING STATIONS.
Rockwell International Corporation, Post Office Box 1085, 1049 Camino Dos Rios, Thousand Oaks, California 91366 (NOTE: Contract contains an option for twelve (12) months for additional services with a value of $679,158)

**Contract No. 68-02-0663,** Modification No. 2 ................................................ *$178,989*
TRACE METAL ANALYSIS OF MATERNAL-FETAL TISSUE SETA, HOUSE DUST SPECIMENS AND HUMAN SCALP HAIR.
Stewart Laboratories, Inc., 820 Tulip Avenue, Knoxville, Tennessee 37921

**Contract No. 68-02-0559,** Modification No. 1 .......................................................... *$241,972*
COMMUNITY STUDIES TO PROVIDE DATA ON THE EFFECTS OF PESTICIDES USE ON PUBLIC HEALTH.

Washington State Department of Social and Health Services, Public Health Building, Olympia Airport, Olympia, Washington 98501 (NOTE: Contract contains two (2) twelve (12) month options with a value of $270,300 and $286,518 respectively)

**Contract No. 68-02-0549** .......................................................... *$240,000*
COMMUNITY STUDIES TO PROVIDE DATA ON THE EFFECTS OF PESTICIDES USE ON PUBLIC HEALTH.

Colorado State Department of Health, Community Pesticide Study, P. O. Box 579, Greeley, Colorado 80631 (NOTE: Contract has been amended to increase period of performance by 24 months. Modification includes options for two (2) additional twelve (12) month periods in the amounts of $265,000 and $281,000 respectively)

**Contract No, 68-02-0577** .......................................................... *$228,000*
SOUTH CAROLINA COMMUNITY STUDIES ON PESTICIDES.

Medical University of South Carolina, 80 Barre Street, Charleston, South Carolina 29401 (NOTE: Contract has been amended to increase period of performance by 11 months. Modification includes options for two (2) additional twelve (12) month periods in the amounts of $266,060 and $282,024 respectively)

**Contract No. 68-02-1349,** RFP No. Du-73-A076 .......................................................... *$246,626*
ECONOMIC ANALYSIS OF EMISSION STANDARDS AND AIR QUALITY STANDARDS.

Arthur D. Little, Inc., 20 Acorn Park, Cambridge, Massachusetts 02140 (NOTE: Contract contains options for an additional 9,000 man hours at $286,236)

# SUBJECT FIELDS AND SCOPE NOTES

## 1. EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

## 2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry--e.g., automobiles.

## 3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

## 4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

## 5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

## 6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

## 7. EFFECTS--HUMAN HEALTH

Covers medical and epidemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

### 8. EFFECTS--PLANTS AND LIVESTOCK

Effects on vegetation--crops, trees, other plants--and on livestock as distinguished from laboratory experimental animals.

### 9. EFFECTS--MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

### 10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

### 11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

### 12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractual activities and program descriptions.

### 13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes public opinion studies, public relations, and public information.

### 14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

# ABSTRACT BULLETIN

## EMISSION SOURCES

### 1973

**28523** **APTIC NO. 50405**

**Ministry of International Trade and Industry (Japan) Public Nuisance Security Bureau**

A SURVEY OF NOX IN EXHAUSTS. *(NOx haiki jokyo no gaiyo). Text in Japanese. 14p., Jan. 1973.*

**Nitrogen oxides emissions from various industries were investigated. The maximum NOx concentration in stack gases from power plants ranged from 171 to 1080 ppm. The highest NOx concentration was from stack gas using coal as the fuel. The maximum NOx concentration in stack gas from a sintering furnace with a capacity of 8800 tons/day using coke furnace gas as a fuel was 226 ppm. The maximum NOx concentration in stack gases from boilers of oil refineries ranged from 200 to 340 ppm depending on the boiler capacity and the fuel used. The highest NOx concentration resulted from nitric acid manufacturing facilities which emitted gas containing as high as 2000 ppm of NOx. Operating variables, NOx and nitrogen oxide levels and other factors at each industry were listed.**

**28524** **APTIC NO. 50509**

HEAT RELEASE INTO WATER OR AIR BY THERMAL POWER PLANTS. *(Die Waermeabfuehrung an wasser oder luft bei waermekraftwerken). Text in German. Energie Tech., 25(1):8-10, 1973.*

All thermal power plants face the problem of where to discharge the waste heat which is produced in considerable quantities. For each kWh produced by the generator, more than the one and a half times the energy is liberated behind the generator in form of waste air. This waste heat can be either released into the water or into the atmosphere. Since water bodies are no longer capable of taking the waste heat, only the second way will be open in future. Wet cooling towers have been longest in use. The cooling water circulates between turbine condenser and a wet cooling tower. In the latter, the cooling water runs over installations from a height of 10 m into the basins below giving off its heat to a naturally or artificially produced flow of air. Part of the water evaporates during this process (between 1 and 2.5 kg/kWh) and might lead to fog formation in the vicinity of the tower. This disadvantage is avoided in dry cooling towers. But they are not quite as efficient as wet cooling towers. Direct air cooling has been quite successfully applied in smaller plants.

**28525** **APTIC NO. 50567**

MUCH DEPENDS ON NATURAL GAS AND MUCH MOVES TOWARD NATURAL GAS. *(Am Erdgas haengt zum Erdgas draengt doch alles). Text in German. R.A.S./Rohr-Armatur-Sanitaer-Heizungstech., 28(3):230-234, 1973.*

In 1965 only 4% of all central heating systems for apartments were operated with gas. In 1970 the percentage had gone up to 9%. By 1975 an increase to between 18 and 20% is expected. Natural gas consists of primarily methane (85%) and a hydrocarbon compound which can be completely burned. West Germany mines 22 billion cu m/yr of natural gas. About the same quantity is imported. Natural gas will be increasingly used for domestic heating, particularly since small-scale desulfurization of the off-gases is not possible. No other fuel is entirely free of sulfur compounds. During the combustion of hard coal, 1.0 to 3.5 g SO2/cu m are emitted, of coke 1.5 to 3.5 g, of soft coal from the Rhine area 0.3 to 2.0 g, and of fuel oil up to 1.0 g SO2/cu m.

**28526** **APTIC NO. 50681**

BLAME ON PLASTICS - REASONABLE? (Kunststoff als Pruegelknabe - zu Recht)? Text in German. Technica, 22(6):442-444, 1973.

The percentage of plastics in the residential refuse actually amounts to 3% and is expected to rise to 6% in 1980. Plastic waste can be deposited without any problems, since it can be compressed and shredded without problems. When burning plastics, it usually decomposes into carbon dioxide and water so that no harmful substances are emitted into the air. The combustion of polyvinyl chloride leads to the formation of carbon dioxide, water, and hydrochloric acid. Since the percentage of polyvinyl chloride in the refuse now is 0.25% and will not exceed 1% in 1980 there is no danger that the permissible emission concentration will be reached in the near future. Therefore an absorption of the hydrochloric acid which would not cause any technical diffi culties, is not necessary. Tests conducted in the surroundings of a refuse incineration plant showed that no air pollution by hydrochloric acid was caused by this plant. Corrosion caused by combustion products of polyvinyl chloride can be easily avoided by technical means.

**28527** **APTIC NO. 50824**

Automotive Environmental Systems, Inc., Westminster, Calif.

A STUDY OF EMISSIONS FROM LIGHT DUTY VEHICLES IN SIX CITIES. *Office of Air and Water Programs Contract 68-04-0042, Pub-APTD-1497, 309p., March 1973. 4 refs.*

NTIS: PB 220142; GPO

A comprehensive study of emissions from light duty vehicles was performed in six cities of the United States to determine the contribution to atmospheric pollution by the vehicle population. Over 1000 vehicles of the 1957 through 1971 model years were tested to determine the levels of hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen oxides exhaust emissions. Evaporative emission tests using the SHED technique were performed on a subsample of vehicles in Los Angeles and Denver. Vehicle emission test procedures included the 1972 and 1975 Federal Test Procedures, steady state tests at idle, 15 mph, 30 mph, 45 mph, and 60 mph, as well as the 125-second Federal Short Cycle. Also included was the measurement of effluents during 32 acceleration and deceleration modes between all possible combinations of the steady state conditions. All vehicle exhaust emissions, which were measured by the constant volume sampling technique, were of similar magnitude among all cities except Denver. Carbon monoxide and hydrocarbon effluents were significantly higher at high altitude, but nitrogen oxides were significantly higher at high altitude, but nitrogen oxides were significantly lower. Relatively small differences in average hydrocarbon levels among manufacturers were obtained, although compact and other small vehicles showed lower emission values. Greater differences in CO, CO2, and NOx were evident among manufacturers. The 1968 through 1971 model year vehi cles, which were subject to Federal emission controls, exhibited lower mean HC and CO levels than the 1957 through 1967 model year vehicles, although nitrogen oxides levels were higher from the new, controlled vehicles. Hydrocarbon evaporative emissions were over twice as high in Denver as Los Angeles. Comprehensive statistical analyses of emission results by city, manufacturer, make, model year, and engine class are presented. (Author abstract)

**28528** **APTIC NO. 50658**

Auerbach, S. I.

SURVEY OF OZONE PRODUCTION ASSOCIATION WITH ENERGY PRODUCTION FACILITIES. *In: Environmental Sciences Division. Annual Progress Report. For Period Ending September 30, 1972. Oak Ridge National Lab. Tenn., p. 36-37, Feb. 1973. 4 refs.*

NTIS: ORNL 4848

Ozone production associated with energy production facilities was surveyed. Ozone is a component Of the photochemical smog complex, its production results from light-mediated reactions of atmospheric oxygen in the presence of elevated levels of sulfur oxides and nitrogen oxides. Ozone formation also occurs around high-voltage conductors as a result of ionization of air and water vapor particles. Analysis of ozone concentrations directly beneath two 500-kV transmission lines on three occasions revealed O3 concentrations ranking from 0.18-0.21 ppm, 0.02-0.03 ppm, and 0.04-0.06 ppm. A more elaborate experimental design is required to establish correlations between ozone concentrations, site location, meteorological conditions, and possible sources.

**28529** **APTIC NO. 50659**

Auerbach, S. I.

TRACE CONTAMINANTS MEASUREMENTS AT AND AROUND THE ALLEN STEAM PLANT FACILITY. *In: Environmental Sciences Division. Annual Progress Report. For Period Ending September 30, 1972. Oak Ridge National Lab., Tenn., p. 53-54, Feb. 1973. 2 refs.*

NTIS: ORNL-4848

Trace quantities of mercury, cadmium, vanadium, zinc, titanium, lead, nickel, and uranium were measured at a coal-fired steam plant. The study consisted of two parts: in-plant sampling in an attempt to obtain a mass balance for as many elements as possible, and sampling in the environment in an attempt to measure any enrichment due to plant discharges of the various elements in the ambient air, the soil, plant life, or water, and biota of the stream receiving the ash pond outflow. Gas-phase sampling around the precipitators and in the stack focused primarily on collecting particulate matter. To date, two 15 cm deep soil cores were collected at 1 mi intervals along the 40 mi north-south transect corresponding to the prevailing wind direction. Analyses for mercury, lead, cadmium, and copper are given. Considerable variation of concentration was found with distance for these elements measured. Peak concentrations were observed at 2-5 mi south of the plant and at 6-10 and 14-17 mi north. No appreciable part of the soil concentration variations could be attributed to the steam plant.

**28530** **APTIC NO. 50661**

Auerbach, S. I.

FLY ASH MICROCOSM STUDY. *In: Environmental Sciences Division Annual Progress Report. For Period Ending September 30, 1972. Oak Ridge National Lab., Tenn., p. 58, Feb. 1973. 2 refs.*

NTIS: ORNL-4848

A fly ash aquatic microcosm study revealed fossil-fuel burning as a source of regional mercury contamination. The average mercury concentration in coal was reported to be from 0.2 ppm to 3.3 ppm. There were no reports of measurements of the mercury concentration of coal fly ash collected in areas distant from the stacks where it was discharged, but fly ash collected from stack precipitators contained 0.2 ppm mercury, while the coal contained 0.3 ppm mercury. It was calculated that 90% of the mercury in the coal was lost out of the stack during normal furnace operations.

**28531** **APTIC NO. 50566**

Bernert, Juergen and Heinz Janott

DUST EMISSIONS IN PLANTS FOR BITUMINOUS ROAD CONSTRUCTION AT HOME AND ABROAD. *(Staub-Emissionen in-und auslaendischer Anlagen fuer den bituminoesen Strassenbau). Text in German. Wasser Luft Betrieb, 17(4):122-126, 1973. 8 refs.*

Drying drums of plants for bituminous road construction are required by law to be equipped with a waste gas dust cleaning system. The system must guarantee a reduction of the dust concentration to 150 g/cu m moist gas. The waste gases must be discharged through a stack rising to 12 m above the ground level. Other dust sources are required to be entirely encapsulated and connected to the dust cleaning system. This legislation was introduced in 1968 and was effective at first only for newly erected plants. In July of 1970 it also became effective for already existing plants. This legislation was preceded by a series of measurements. The results of such measurements taken in two plants with a mixing capacity of 70 to 80 tons/day are listed in tables. The two plants were equipped with a cyclone followed by a filter. The combined cyclone and filter had a collection efficiency of 99.7%. In four foreign plants, one equipped with a combined multicyclone and wet centrifugal separator and three others with multicyclones only, dust measurements in the cleaned gas were taken for comparison. In all four instances the legal requirements effective in West Germany were not met. Maximum allowable dust emissions in the VDI guidelines and the technical directives for the maintenance of clean air are expressed in quantity only. They do not take into account the dust quality, its analytical composition, or its grain size distribution.

**28532** **APTIC NO. 50666**

Bieser, C. O.

IDENTIFICATION AND CLASSIFICATION OF COMBUSTION SOURCE EQUIPMENT (FINAL REPORT). *Processes Research, Inc., Cincinnati, Ohio, Environmental Protection Agency Contract 68-02-0242, Program Element 1A2014, EPA-R2-73-174, Task 6, 81p., Feb. 1973. 58 refs.*

NTIS: PB 218933

Stationary fuel-burning equipment which can produce air pollutant emissions was identified and classified by technical and functional features. More detailed information is presented on gas turbines and kilns, including fuels, sizes, processes, industries, products, and manufacturers. Gas turbine related facts reported include: present installed capacity should double in the next 5-9 yr; present national fuel use is about 1-1.5% of the total consumption of natural gas and oil; and the major pollutant is nitrogen oxide, with smoke a secondary, more controllable contaminant. Kiln related facts include: growth rates of related industries are low, except for being moderate in the lime industry; present total national fuel use is about 0.5-1.0% of the natural gas and oil, and about 2-2.5% of the bituminous coal (cement and lime industries account for more than 75% of the gas and oil, and nearly all of the coal consumed), and there is almost no emissions data available.

**28533** **APTIC NO. 51004**

Darweger, Karl-Heinz

PRO AND CONS OF THE MODERN POWER SUPPLY. *(Pro und contra zur modernen Energieversorgung). Text in German. Elektrotech. Z. B., 25(7/8):140-142, 1973. 2 refs.*

Since the beginning of this century the consumption of electric energy in industrial countries doubled every decade. With conventional methods the rising demand of power can no longer be covered primarily for reasons of environmental protection. Presently about one half of fossil fuel energy is lost in the form of waste heat. The same is true for nuclear power plants. To date the problem of loss-free energy conversion has not yet been solved. Better heat insulation in homes and improved use of machines saves only small amounts of energy. According to an estimate, 100 GW power will be generated by 1980 in West Germany, 25% of which will come from nuclear power plants. To cover the demand 13 more GW are necessary for which nuclear power plants shall be constructed. The population opposes the construction of nuclear power plants mainly for reasons of environmental pollution such as waste heat emission by large cooling towers. A nuclear power plant which was to go up would have required the construction of a cooling tower 160 m high and 135 m in diameter. The tower would have evaporated 1 cu m water/sec. The project was opposed by vineyard owners for fear it would create too much fog. Nuclear power are still less polluting than conventional power plants, however.

**28534** **APTIC NO. 50938**

Davids, P.

**AIR POLLUTION THROUGH POLLUTANT EMISSION FROM INCINERATORS.** *(Die Luftbelastung durch die Schadstoffemission aus Muellverbrennungsanlagen). Text in German. Muell Abfall, 5(3):61-68, 1973. 17 refs. (Presented at the Muelltechnische Kolloquium, Stuttgart, West Germany, March 8, 1973.)*

The incinerators in operation in the Federal Republic of Germany today are all similar in their design with the exception of individual components. For dust cleaning of the effluents, electrostatic precipitators are mostly used. A removal of gaseous pollutants is generally not pursued. In six incinerators a 1-week measurement program was launched to determine the type and quantity of the components of trash and their distribution in the gaseous and solid combustion residues which are important for air pollution. The dust measurements were taken behind the electrostatic precipitator to determine the dust composition in the cleaned gas. Main components were silicon aluminum, and iron compounds. The measured lead concentrations were below 1%, the zinc concentrations below 5.3%. In two samples none of these two components could be determined. Concentrations of chlorine, phosgene, hydrogen cyanide, hydrogen sulfide, and ammonia were about 1 mg/cu m (detection limit) or they were not detectable at all. For Cl2 and COCl2 this was also true in cases were 6% polyvinyl chloride had been added to the trash. Correlation of the measurement results yielded a significant relationship between hydrogen chloride and hydrogen fluoride emissions. Five hundred values for HCl and sulfur dioxide were available taken in one incinerator since 1966. For the period 1966 to 1972 a steady decline of the SO2 emission by about 1/3 was discernible. The HCl emission rose between 1967 and the beginning of 1970 by about 100%. Since then it remained constant.

**28535** **APTIC NO. 50708**

Finney, J. P., F. J. Miller, and D. B. Mills

**GEOTHERMAL POWER PROJECT OF PACIFIC GAS AND ELECTRIC COMPANY AT THE GEYSERS, CALIFORNIA.** *IEEE (Inst. Elec. Electron. Engrs.) Trans. Power App. Systems, 92(1):108-115, Jan./Feb. 1973. 4 refs. (Presented at the Institute of Electrical and Electronic Engineers, Power Engineering Society, San Francisco, Calif., July 9-14, 1972, Paper T72585-8.)*

Utilization of the earth s geothermal energy resources for production of electric power has been achieved in several areas throughout the world. The only commercial development in operation in North America is at The Geysers north of San Francisco. A 12 MW unit commenced operation in 1960, and additional units have been added bringing the total capacity to 192 MW. Design and construction now under way will increase this to 522 MW by the end of 1974. There are plans for continuing increments of approximately 100 MW per year as steam reserves are developed. The steam supply, mechanical and electrical features, operating experience, and special problems are described. (Author abstract)

**28536** **APTIC NO. 50940**

Frie, W.

**GAS COMPOSITION, HEATING VALUES, AND HEAT ENTHALPY OF THE CRACKING REACTION.** *(Gaszusammensetzung, Heizwerte und Waermetoenung der Spaltgasreaktion). Text in German. Siemens Forsch. Entwicklungsber., 2(1):63-66, 1973. 7 refs.*

The composition of the cracking gas at thermodynamic equilibrium was calculated, and the soot formation was investigated. Furthermore, the heating value of the combustion gas supplied to the engine and the heat enthalpy of the cracking reaction was calculated. Cracking gas of the same composition can be produced from gasoline plus waste gas instead of air. Thirty components of the gas were taken into account in the calculation of the cracking gas composition. Two graphs illustrate the cracking gas composition at lambda 0.1 as function of the temperature and the mole fraction. The partial equilibria obtained from the calculation of the cracking gas composition form the basis for the calculation of the heating values and the heat enthalpy of the cracking reaction. Depending on lambda, three zones were obtained. In zone one, both reactions, the gasoline-air reaction as well as the gasoline waste gas reaction, are endothermal (no stationary adiabatic operating point); in zone two, the gasoline-air reaction is exothermal and the gasoline-waste gas reaction endothermal (optimum regulating range); and in the third zone both reactions are exothermal (no stationary adiabatic operating point).

**28537** **APTIC NO. 50961**

Gerhards, Kurt

**SYNTHETIC WASTE IN TRASH AND ITS EMISSIONS FROM INCINERATORS. STUDIES AND DEVELOPMENT TRENDS.** *(Kunstoffabfaelle im Muell und ihre Emissionen aus Muellverbrennungsanlagen. Untersuchungen und Entwicklungstendenzen). Text in German. Muell Abfall, 5(3):68-71, 1973. 4 refs. (Presented at the Muelltechnische Kolloquium, Stuttgart, West Germany, March 8, 1973.)*

In the year 1971 six 1-week measurement series were conducted with the aim of determining weight, type, and amount of synthetics in domestic refuse. Each resident throws away 4.1 kg of synthetic wastes/yr. A number of synthetics, primarily polyamides and polyurethanes, contain up to 19% nitrogen. Of the synthetic wastes in domestic refuse, polyamid contained 4.9%. Between 0.1 and 0.2 kg nitrogen/ton refuse are disposed of. The contribution of synthetics to the emission of nitrogen oxides is rather insignificant. None of the more important synthetics contain sulfur. The most important fluorine containing synthetic is polytetrafluorethylene, but its fraction among the synthetics is so small that no fluorine could be detected. Chlorine is an essential component of chlorinated polyethylene, polyvinylchloride, and polyvinylidenechloride. In domestic refuse from Bochum a chlorine fraction of 5.0% was found. The total chlorine fraction in the Bochum domestic refuse amounted to 3.45 kg/ton refuse, the fraction constituted by the synthetics alone 0.95 kg/ton refuse. Based on this data, the synthetic s share to hydrogen chloride emission for domestic refuse is 32%. Based on an estimated specific domestic refuse accumulation of 256 kg/resident/yr by 1980, an industrial refuse quantity of 116 kg/resident/yr, a bulky and communal refuse quantity of 34 kg/resident/yr synthetic quantity of 5.9%, the average chlorine emission will be 5.7 kg/ton waste. This is 50% more than in 1971.

**28538** **APTIC NO. 51017**

Gills, B. G.

PRODUCTION AND EMISSION OF SOLIDS, SOX, AND NOX FROM LIQUID FUEL FLAMES. PAPER 9. *J. Inst. Fuel, 46(383):71-76, Feb. 1973. 21 refs. (Presented at the Institute of Fuel, National Convention, 1st, Sheffield, England, June 5-8, 1972.)*

Data on the production and emission of solids, sulfur oxides, and nitrogen oxides during the combustion of liquid fuels are summarized. The data were obtained on industrial equipment from various countries under normal field conditions. Where similar information was published by other workers, a comparison of the results is given. The significance of the field results is demonstrated by comparison with existing or projected atmospheric pollution legislation in Europe and America. The potential improvement in emission levels of pollutants, which can be achieved by modifications to equipment design or application, is also given. The data reviewed include solid emissions, influence of operating conditions and mechanical modifications to plants, combustion intensity, atomization, swirl, and preheat temperature. Sulfur oxides emission sources reviewed include boiler plants, gas turbines, and brick kilns. Photochemical smog formation and power plant emissions are considered in relation to emissions of nitrogen oxides.

**28539** **APTIC NO. 50975**

Goossens, Walter

HOT BRIQUETTING OF HARD COALS BY THE ANCIT METHOD OF THE ESCHWEILER BERGWERKS-VEREIN. *(Cie Heissbrikettierung von Steinkohlen nach dem Ancitverfahren des Eschweiler Bergwerks-Vereins). Text in German. Glueckauf (Essen), 109(10):521-524, May 10, 1973. 7 refs.*

Hot-briquetting by the ancit method of the Eschweiler Bergwerks-Verein was developed in the mid-fifties with the aim of producing low-smoking fuel for domestic heaters from coal with a low fraction of volatile matter. Anthracite, lean coal, or fine coke is extruded hot with a coal suitable as binding agent. Before the coal is injected into the reactor it is heated within a .1 sec to a temperature of about 600 C. Due to the high heating speed, the coal is comminuted through instant evaporation of the water and through rapid degassing. The coal coming from the reactor is separated from the waste gas in a cyclone. The waste gas goes to a second smaller reactor where the binding agent is pneumatically injected. Here the waste gas preheats the binding agent to 700 or 800 C. In a second cyclone the binding agent and the waste gas are separated. The waste gas is cleaned in a scrubber and burned in a flare. The two components are mixed. Through heat exchange they assume a temperature of 460 to 520 C. At this temperature the binding agent softens and binds the inert component. The process is non-polluting and produces a low-smoking fuel.

**28540** **APTIC NO. 50833**

Hare, Charles T. and Karl J. Springer

EXHAUST EMISSIONS FROM UNCONTROLLED VEHICLES AND RELATED EQUIPMENT USING INTERNAL COMBUSTION ENGINES. FINAL REPORT. PART II. OUTBOARD MOTORS. *Southwest Research Inst., San Antonio, Tex., Emission Research Lab., Office of Air and Water Programs Contract EHS 70-108, APTD-1491, AR-850, 97p., Jan. 1973. 14 refs.*

NTIS: PB 220399

Exhaust emissions from four two-stroke outboard motors were measured before and after being bubbled through water, and the constituents measured were: total hydrocarbons by flame ionization analysis; carbon monoxide, carbon dioxide, nitric oxide, and hydrocarbons by non-dispersive infrared spectrometry; nitric oxide and nitrogen oxides by chemiluminescence; oxygen by electrochemical analysis; light hydrocarbons by gas chromatography; and total aliphatic aldehydes and formaldehyde by the MBTH and chromotropic acid methods, respectively. The engines tested were a Chrysler 35 hp twin, a Mercury 65 hp in-line four, and OMC twins of 4 hp and 9.5 hp. The engines were operated on stationary test stands with power absorption by electric (eddy current) dynamometers driven from the propeller shafts. Pertinent operating data were recorded along with emissions, and mass emissions computed from data gathered during this project were used in conjunction with available sales and usage data to estimate national emissions impact. (Author abstract)

**28541** **APTIC NO. 50493**

Hayashi, H.

DEVELOPMENT OF A LOW POLLUTION AUTOMOBILE ENGINE SYSTEM. *(Teikogai jidosha enjin shisutemu no kaihatsu). Text in Japanese. Nihon no Kagaku to Gijutsu (Japan Sci. Technol.), 14(2):11-18, Feb. 1973.*

Automobile emission standards for 1976 will require drastic reduction of hydrocarbons, carbon monoxide, and nitrogen oxides. Therefore, a standard control system must be decided on at least one year ahead. Engine modifications, stratified charge engines (such as compound vortex controlled combustion), rotary engines, and two-cycle engines are possible control systems. Japan is ahead of the U. S. in developing the last three systems, however it has a long way to go. Over 100 million dollars were invested in developing the control systems in 1972.

**28542** **APTIC NO. 50568**

Hellmers, P.

NON-POLLUTING REMOTE HEATING PLANT OPERATED WITH HEAVY FUEL OIL. *(Umweltfreundliches Fernheizwerk mit Schweroelfeuerung). Text in German. Heizung-Lueftung-Haustech., 24(3):86-89, March 1973. 3 refs.*

In 1969 it was decided to supply the new development area of the municipality Dietzenbach, south of Frankfurt, with remote heat. The remote heat production plant was erected in the industrial area adjoining the new residential section. This site was selected to spare the residents the annoyance caused by operation of the plant and by the fuel delivery. The first stage which is under construction will serve an area with a heat demand of 60 Gcal/hr. The plant will have four boilers, each with two separately operating combustion chambers. Pressure atomizers will be used as burners which can be easily switched from operation with light fuel oil to heavy fuel oil. For the warming up period, the boilers will be heated with light fuel oil to avoid formation of soot flakes. Each boiler will have its own stack flue. The individual flues are accommodated in the joint stack. Initially the stack will rise to a height of 75 m and later to 90 m as the plant is expanded. Boiler, combustion, and stack will be carefully matched to each other to permit optimum operation and lowest possible emission without expensive dust collectors.

**28543** **APTIC NO. 50707**

Henahan, John

FULL STEAM AHEAD FOR GEOTHERMAL ENERGY. *New Scientist, 57(829):16-17, Jan. 4, 1973.*

Geothermal wells as the possible alternative source of energy are being considered by the several power companies in the U. S. Geothermal power in the form of steam or hot water are investigated. There is a highly successful operation at the Geysers, a geothermal steam field operated by a group of companies including Union Oil and Pacific Gas and Electric. The power plant is providing 275 megawatts of electric power. The Geysers plant, like similar geothermal steam plants in Italy and Mexico, is cheaper to build and operate than conventional gas, fossil, or nuclear fuel plants.

**28544** **APTIC NO. 50871**

High, Dean

AIR POLLUTION. *Waste Age, 4(1):46-48, 50, 82, Jan.-Feb. 1973.*

The environmental implications of incineration are discussed. An existing waste disposal system consisting of a single-chamber, gas-fired, overfire air blower incinerator with no air pollution control equipment was tested. Then a replacement multi-chamber incinerator was tested which had a scrubber. The methods used for the particulate emission tests and different test methods of interpreting certain gas emission data are reported. Particle loading and size distribution tests for both incinerators were conducted using the method of Gruber and Schumann. Several charging rates were utilized to evaluate the effect of loading on particulate emissions from a modified incinerator. Tests were conducted on the effluent from the modified incinerator to evaluate the effect of charge, combustion air and auxiliary fuel on the emissions. A sharp distribution in particle size emissions was noted between emissions from the uncontrolled and controlled incinerators. Smoke observations, and gaseous emissions were made during each series of tests. The modified incinerator generated only about 1/3 of the particulate emissions generated by the uncontrolled incinerator. The incinerator effluent gases from the scrubber contained less than 0.026 grains of particulate/ standard cu ft of exhaust gas. Smoke shade, odors, sulfur oxides, nitrogen oxides, carbon monoxide, ammonia, and hydrocarbons were measured.

**28545** **APTIC NO. 50933**

Iinuma, Kazuo

REACTION MECHANISM OF NOX OCCURRENCE AND ITS CONTROL. *(Sanka chisso hassei no hanno kiko to sono seigyo). Text in Japanese. Nippon Kikai Gakkai-shi (Journal of the Japanese Society of Mechanical Engineering) (Tokyo), 76(653):650-656, May 1973. 32 refs.*

The formation and decomposition of nitrogen oxides are slow compared with the combustion reaction of hydrocarbons. These reactions probably take place in the combustion gas behind the flame zone where the flame reaction is almost finished. If the local conditions and length of the reaction are known, reaction rate calculation can be used to calculate the amount of NOx in the exhaust gas. Theoretical and experimental results agreed. Flame temperature affects NOx concentration to the greatest degree. In a spark ignition engine, the suppression of the temperature in early combustion greatly reduces NOx. Oxygen concentration in the combustion gas behind the flame zone is also important in reducing the concentration of NOx in automobile exhaust gas.

**28546** **APTIC NO. 50510**

Kilian, F. P.

NON-POLLUTING TRANSPORTATION SYSTEMS. *(Umweltfreundliche Verkehrstechniken). Text in German. Umschau (Frankfurt), 73(7):211-213, 1973. 4 refs.*

Mass transportation is discussed including rail traffic carrying motor vehicles and persons, urban track systems, and electric cars. With the decreasing appeal of public transportation it is expected that in a city with a population of 400,000 by the year 2000 only 20% of about 180 million passenger trips/yr will be made by public transportation (street cars and buses). If one of the new systems under development, for instance the cabin system CAT, is used, it is expected that 50% of all trips will be made by using this system. This would mean a reduction of the pollutant emission by 6 million bus km/yr or 180 million passenger cars km/yr. Similar reductions of noise and air pollution could be achieved by using high-speed, long-distance rail traffic. Electric cars will hardly gain importance for individual passenger traffic, but for public mass transporation they provide an alternative to conventional buses with no polluting exhaust gases.

**28547** **APTIC NO. 50391**

Kohno, Hisashi and Takazumi Niwa

UBE HEAVY OIL GASIFICATION AND DESULFURIZATION PROCESS. *(Ube-shiki jushitsuyu gasuka datsuryu purosesu). Text in Japanese. Nenryo Kyokaishi (J. Fuel Soc. Japan, Tokyo), 52(552):249-254, April 1973. 9 refs.*

A heavy oil gasification and desulfurization process is examined. The residual oil is gasified in a fluidized bed. Most of the sulfur is converted into hydrogen sulfide which is then removed in a gas phase by the conventional absorption process. The high calorie product gas (6000-8000 kcal/cu Nm) is practically free of all sulfur compounds and can be used as a fuel gas.

**28548** **APTIC NO. 50903**

Kollrack, R. and L. D. Aceto

THE EFFECTS OF LIQUID WATER ADDITION IN GAS TURBINE COMBUSTORS. *J. Air Pollution Control Assoc., 23(2):116-121, Feb. 1973. 17 refs.*

The addition of liquid water, in quantities equivalent to the mass of fuel compound, exerts thermal and chemical effects upon the combustion process in a gas turbine engine. The thermal influence is produced by the vaporization and heating of the water and its vapor. The final temperature is reduced and the concentrations of nitrogen oxides, oxygen, hydroxides, and carbon monoxide are lower than standard combustion concentrations. Chemically, the additional water participates in reactions producing the aforementioned species. The lower temperature overrides this influence. These effects have been assessed for different fuel states such as premixed combustion and fuel undergoing vaporization and mixing. Chemical reactions and reaction mechanisms are discussed. (Author abstract modified)

**28549** **APTIC NO. 50874**

Lewis, Clifford

WATER POLLUTION PROBLEMS ASSOCIATED WITH CONTROL OF STACK GAS EMISSION. *Ind. Wastes, 19(1):IW/19-21, Jan./Feb. 1973. 3 refs. (Presented at the Purdue Industrial Waste Conference, 27th, Annual, Purdue Univ., Lafayette, Ind., May 2-4, 1972.)*

There are many sources of stack gas emission which readily qualify as atmospheric pollutants under Environmental Protection Agency recommended standards. These range from garbage incinerators, sawdust burners and various chemical manufacturing operations to smelters and coal burning power plants. The water pollution potential resulting from the clean up of gases from metallurgical smelters and coal burning power plants is discussed. From the coal burning power plants about 12 million tons of sulfur dioxide were discharged into the atmosphere in 1969. At least 3 million tons of fly ash as particulate matter were available for atmospheric discharge. In the case of metallurgical smelters, about the same quantity of sulfur dioxide was emitted into the atmosphere. Analyses of particulate matter, nitrogen oxides, sulfur dioxide, carbon dioxide, oxygen, nitrogen and water vapor from coal burning power plants and copper smelters are presented.

**28550** **APTIC NO. 50953**

Masek, Vaclav

STUDY OF THE PROPERTIES OF FLY DUST IN THE PITCH INDUSTRY. *(Ueber die Eigenschaften des Flugstaubes in der Pechindustrie). Text in German. Bitumen Teere-Asphalte-Peche, 24(11):218-223, 1973. 4 refs.*

Fly ash samples were taken over a long period of time from a hard coal pitch plant. After identification of the appearance of the small particles under an electron microscope and after determination of the ash concentration, the grain size, the specific surface, and the benzo-3,4-pyrene concentration, the physical chemical properties of the fly dusts were studied. For evaluation of the basic sorption properties, the adsorption coefficient and the adsorption exponent of Freundlich's equation was used. The flow potential was measured on chlorine silver electrodes in Shukow's apparatus, the contact catalytic property was determined by the speed of the hydrogen peroxide dissociation. The processes of ion exchange were studied by means of selective coefficients. The adsorption of gases was determined in an apparatus by Puchly and Vavruch, the adsorption of vapors in a modified apparatus of Timofejew. Finally, some enzymatic reactions were studied. Very fine grains, presence of sharp-edged particles and of benzo-3,4-pyrene make this fly dust an undesirable one. Moreover, the physical-chemical experiments rendered the fly dust nearly inactive.

**28551** **APTIC NO. 50965**

McCaull, Julian

WINDMILLS. *Environment, 15(1):6-17, Jan.-Feb. 1973. 12 refs.*

The feasibility of using windmills for electric power generation is examined with respect to design, efficiency, costs, and operation. Prodigious amounts of electricity could be produced, and windmills are technically and economically feasible. They are a clean source of power, whereas nuclear and fossil-fuel power plants produce dangerous pollutants. Experiences with a 1250-kilowatt, wind-powered generator with stainless steel blades are described. The most economical plan in the U. S. appears to be the use of large wind machines to generate alternating electrical current that would be fed into existing water or water-and-steam powered networks. Capital costs for the installation of windmill equipment, however, would be much larger than for conventional equipment. Major developments around the world are discussed. Large scale employment of wind power could possibly generate fuel or fuel-cell electricity at rates potentially competitive in selected power markets.

**28552** **APTIC NO. 50492**

Miyamoto, Akio

TRENDS IN JAPAN AND OVERSEAS OF DECREASING AUTOMOBILE EMISSIONS. *(Jidosha teikogaika e no naigai no doko). Text in Japanese. Nihon no Kagaku to Gijutsu (Japan Sci. Technol.), 14(2):3-10, Feb. 1973.*

Air pollution in Los Angeles, New York, Pittsburgh, Chicago, London, Paris, and Japan are described. Automobile traffic has increased more than eight times in Japan in the last 10 years, although it has only doubled in the U. S. and Europe. Automobiles have caused serious pollution in Japan. Control methods include Honda's compound vortex controlled combustion engine (stratified charge) fuel additives, catalytic afterburners, and engine modifications. Gas turbine and steam engines are low in nitrogen oxide and hydrocarbon emissions, but still produce some pollution. Electric cars can cause indirect air pollution, because of the increased need for electric power plants. Batteries are heavy and low in economy and performance. Hybrid buses using diesel and electric engines have been tried, but the costs are more than double diesel bus costs. For electric engines to be feasible, batteries must be improved without accompanying air pollution. Wind and geothermal sources must also be considered.

**28553** **APTIC NO. 50528**

Oki, Takeo, Tetsu Abe, Akira Sotoyama, and Shigeru Haseba

A METHOD OF REMOVING NITROGEN OXIDES PRESENT IN GAS FROM COAL, COKE, AND OILS BY CATALYTIC HYDROGENATION. *(Sekitan, kokusu, abura nado o genryo to suru gasu-chu ni sonzai suru chisso sankabutsu o sesshokuteki suiso tenka ni yori jokyo suru hoho). Text in Japanese. (Nikki Chemicals Co., Ltd., Tokyo (Japan) and Kobe Steel Co. (Japan)) Japan. Pat. Sho 48-1801. 3p., Jan. 20, 1973. 1 ref. (Appl. Jan. 19, 1968, 2 claims).*

A method of removing nitrogen oxides from coke oven gas, producer gas, oil decomposition gas, and other fuel gases by means of catalytic hydrogenation is described. The catalytic hydrogenation reaction is selective so that hydrogen, carbon monoxide, and ethylene are not removed. The catalyst consists of a copper/chromium oxide, CuO:CuCr2O4, with a 1:0.8 or 1:8 molar ratio or of a composite catalyst mixed with supports such as silica, alumina, or diatomaceous earth which is heat treated at 400-500 C for 5-10 hr in the presence of hydrogen. The latter catalyst may also have 1-8wt% of more than one kind of oxide of manganese, barium, and calcium. In this method of hydrogenation refining, when the hydrogen-treating temperature exceeds 600 C, the hydrogenation power is lowered against NOx, although there is no loss of ethylene.

**28554** **APTIC NO. 50989**

Patrick, E. A. K.

SOME CURRENT BRITISH APPROACHES TO DOMESTIC APPLIANCE DESIGN. *Inst. Gas Eng. J. (London), 13(2):37-47, Feb. 1973. 15 refs. (Presented at the Conference on Natural Gas Research and Technology, 2nd, Atlanta, Ga., June 5-8, 1972.)*

The domestic gas market in England and the development of domestic central heating by hot water are discussed in relation to their effect on the appliances and installations required and the resultant research programs. Current research and development is reviewed with emphasis on combustion characteristics of gases, vitiation of combustion air, ignition, the product of combustion, noise, cooking, meters, central heating boilers, and other space heating appliances. The two most important aspects are undoubtedly the disposal and dispersal of the products of combustion and the need for ignition. Appliances are already at a sufficient level of efficiency, but further development is needed in reducing installation costs and in giving better service. The British market situation and fuel prices in Britain are considered. (Author abstract modified)

**28555** **APTIC NO. 50944**

Rasch, Rudolf

REPORT ON THE DISCUSSION ON PART I OF THE 24TH REFUSE COLLOQUIUM AT THE UNIVERSITY OF STUTTGART MARCH 8, 1973. *(Diskussion Bericht ueber die Diskussion ueber den I. Teil des 24. Muelltechnischen Kolloquium der Universitaet Stuttgart am 8.3 1973). Text in German. Muell Abfall, 5(3):76-77, 1973.*

For the densely populated Ruhr Area, incineration is the most adequate method of solid waste disposal. Doubts were expressed whether a reduction of hydrogen chloride from a maximum of 2000 mg/cu m to 10 mg/cu m is feasible in practice and really necessary. Precipitation carries 50 to 60 kg/hectare/yr of chlorine ions into the soil; incinerators carry only about 2 kg/hectare/yr. A reduction of the maximum allowable emission concentrations for HCl from 0.7 mg/cu m to 0.15 mg/cu m is intended. Hydrogen chloride emissions should not be over emphasized. There was disagreement on the benefit of scrubbers for incinerators. The cold water vapor saturated flue gases leaving the scrubber are also a burden for the neighborhood. Most gaseous components in the effluents from incinerators are so low that a reduction can be achieved only by enormous expenditures. Moreover, the use of scrubbers turns the air pollution problem into a water pollution problem.

**28556** **APTIC NO. 50569**

Roch, Peter

PROBLEMS OF APPLICATION OF ELECTRIC HEAT. INTRODUCTION. *(Probleme der Anwendung der Elektrowaerme. Einfuehrung). Text in German. Elektrizitaetswirtschaft, 72(5):110-112, 1973. 18 refs. (Presented at the VDEW Elektrowaermetagung, Duesseldorf, West Germany, 1973).*

In the West German Industry the power consumption per 100 working hours rose from 312 kWh in 1950 to 1162 kWh in 1971. This rising trend of power consumption is promoted and accelerated by the requirements for the protection of the environment. Electricity is the least polluting power. For the future a more economic use of electric power is sought by heat recovery with heat pumps. This will help at the same time to reduce thermal pollution of the environment. A power plant operating along these lines is going up in the municipality Ilsfeld located along the Autobahn Stuttgart-Heilbronn.

**28557** **APTIC NO. 50570**

Schaefer, Helmut

THE THERMAL POLLUTION OF THE ENVIRONMENT BY HEATING PROCESSES. *(Die thermische Belastung der Umwelt durch Waermeprozesse). Text in German. Elektrizitaetswirtschaft, 72(5):116-117, 1973. (Presented at the VDEW-Elektrowaermetagung, Duesseldorf, West Germany, 1973).*

Assuming that the electric power demand will continue to rise at the present rate, energy consumption will have quadrupled by the year 2000. In densely populated areas thermal pollution will assume proportions equaling the solar energy in these areas. Nobody can, at the moment, predict what consequences this will have. There is only one way to reduce this thermal pollution. High degrees of efficiency must be achieved and all possible ways of power recovery must be investigated. In high temperature processes the overall thermal pollution is not lower if electric heating systems are used. But thermal pollution is and will remain a problem of densely populated areas and in this respect thermal pollution is definitely lower with electric heating at the place of the consumer than fuel heating.

**28558** **APTIC NO. 50512**

Scheel, Henning W.

POWER PRODUCTION WITHOUT POLLUTION OF THE ENVIRONMENT. AN INTRODUCTION IN THE SSPS-PROJECT. *(Energieerzeugung ohne Umweltbelastung. Eine Einfuehrung in das SSPS-Projekt). Text in German. Elektrizitaetswirtschaft, 72(2):22-27, 1973. 20 refs.*

Conventional power production pollutes the environment with carbon monoxide, sulfur dioxide, hydrocarbons, oxides of nitrogen, and dust. In 1970 the primary energy consumption in the Federal Republic of Germany was 328 million tons, 6% or 20 million tons were thrown into the atmosphere as pollutants. Traffic alone emitted 10 million tons, domestic heaters 6 million tons, and the industry and power plants about 2 million tons each. In addition to these pollutants there is the problem of waste heat, the growing shortage of fossil and nuclear fuels. A new method of power supply which avoids all these problems is described. It is based on the use of solar radiation. The concept of a satellite solar power station is outlined. Such a station will transmit 10 GW by radio waves to the earth, which is about ten times the capacity of a very large power plant of today.

**28559** **APTIC NO. 50947**

Schenkel, Werner

FUNDAMENTALS FOR INCINERATORS IN INDUSTRIAL CENTERS. *(Grundsaetze fuer Muellverbrennungsanlagen in Ballungsgebieten). Text in German. Muell Abfall, 5(3):59-61, 1973. (Presented at the Muelltechnische Kolloquium, Stuttgart, West Germany, March 8, 1973.)*

Twelve million cu m/yr of chemically and biologically non-decomposible waste accumulates in the Ruhr. Another 6 million cu m of decomposible waste occurs. Incinerators in the area have a joint annual capacity of 800,000 tons. The waste volume is reduced through incineration to 10-20 vol%. Combustion of 1 ton of trash produces 3000-5000 cu m of flue gas containing 150 mg of dust/cu m, 103,000 mg of carbon dioxide, 40 mg of organic acids 43 mg of chlorine, 43 mg of sulfur dioxide, and 1 mg of sulfur trioxide/cu m. Also, 300-400 kg of slag and 100-200 kg of fly ash are produced. The heat liberated from 1 ton of trash equals 1800 kcal/kg. This heat could be recovered to produce electricity, which in turn would produce more air pollution. Sanitary landfill is an acceptable waste disposal, but not enough land is available. Therefore the use of large incinerators is necessary. Incinerators should be as non-polluting as possible, economical, and utilize waste heat.

**28560** **APTIC NO. 50472**

Schulz, Gerhard and Heinz Hiller

METHOD FOR THE PRODUCTION OF SUBSTITUTE NATURAL GAS. *(Verfahren zur Erzeugung von synthetischem Erdgas). Text in German. Erdoel Kohle (Hamburg), 26(1):11-16, 1973.*

Substitute natural gas is being produced to fill the demand for needed natural gas. Hydrocarbons in the boiling range between liquefied petroleum gas and naphtha are converted to the substitute natural gas by a catalytic process using steam. The substitute gas can be produced with a methane content of 98-99% and a heating value of more than 9400 kcal/N cu m. Several plants are under construction in the U.S. using the BASF/Lurgi gasynthan process. A new variation of this process uses a more active catalytic system to allow thermodynamically more favorable operating conditions. The substitute natural gas requires 0.028 to 0.029 dollars/N cu m. This substitute natural gas will, to a large extent, be burned in households. It is non-polluting because it does not contain any sulfur or any kind of catalyst toxin. Also, the production process of the gas is non-polluting since no waste products are produced. The spent catalysts are so valuable that they can be further treated; all pollutants are concentrated in the zinc oxide which is used in metallurgical plants.

**28561** **APTIC NO. 50963**

Schwarz, Ottmar

GENERATION AND SUPPLY OF ELECTRIC POWER. STEAM AND NUCLEAR POWER PLANTS. *(Fachgebiet: Erzeugung und Fortleitung elektrischer Energie. Dampf- und Kernkraftwerke). Text in German. VDI (Ver. Deut. Ingr.) Z. (Duesseldorf), 115(6):421-432, April 1973. 534 refs.*

A survey of development trends and existing capacities of power generation in the Federal Republic of Germany is given. More than 40,000 steam generators with a capacity of about 300,000 tons/hr are in existence presently. In the year 1971 new power plants and expansions adding a total of 2990 MW went into operation. Of them, 2410 MW were generated with hard coal, 155 MW with oil, 125 MW with natural gas, and 300 MW with soft coal. In the next 5 years another 26,796 MW shall be added. In the years 1969 to 1971 more than $1 times 10 to the 9th power were spent for air pollution measures. Of the amount 61.3% went into investments, 34.2% into maintenance costs, and 4.5% into research and experimental plants. Of the investment costs, 33.8% went into existing plants, 52.4% into new plants, and 13.8% into other measures. In the environmental program by the Federal Government, the possibilities for improved environmental protection on the power supply sector are outlined. Apart from the reduction of dusts, special attention is focused on the emission of sulfur dioxide and the oxides of nitrogen.

**28562** **APTIC NO. 50945**

Seidl, Walter

DESULFURIZATION OF WASTE GASES AND FUELS. *(Entschwefelung von Abgasen und Brennstoffen). Text in German. Brennstoff-Waerme-Kraft, 25(4):155-160, April 1973. 882 refs.*

A literature survey is given concerning desulfurization of waste gases ranging from legislative measures for limitation of sulfur emissions, cost calculation and comparison of costs for various desulfurization processes, separation of sulfur from coal and liquid mineral oil products, coal liquefaction, coal and mineral oil gasification, removal of sulfur oxides from flue gases, combustion process modifications for reducing SOx emissions, technology of low sulfur fuels, and distribution and atmospheric reactions of SOx.

**28563**

**APTIC NO. 50563**

Sporckmann, Hans

ECONOMY OF THE HEAT PUMP FOR OUTDOOR SWIMMING POOL HEATING. *(Wirtschaftlichkeit der Waermepumpe bei der Schwimmbadbeheizung). Text in German. Elektrizitaetswirtschaft, 72(8):230-235, 1973. 8 refs. (Presented at the Internationalen Elektrowaermekongress, 7th, Warsaw, Poland, 1972.)*

Outdoor swimming pools in West Germany are being heated to an increasing extent. The advantage of this is that swimming pools are heat consumers over the summer months. Apart from the conventional fuels for producing heat (oil and gas), electricity is used. The heat pump provides the least air polluting method for heating swimming pools, but it is not the most economical method. The annual costs depend greatly on the size of the basin. They become less the larger the pool is and the longer the swimming season. The principle of the heat pump is briefly outlined.

**28564**

**APTIC NO. 50778**

Takahashi, Takeo

PROBLEMS OF EXHAUST GAS COUNTERMEASURES AND FUELS FOR CARS. *(Haishutsu gasu taisaku to jidosha nenryo no shomondai). Text in Japanese. Nippon Kikai Gakkai-shi (Journal of the Japanese Society of Mechanical Engineers) (Tokyo), 76(653):636-641, May 1973. 13 refs.*

The increase of photochemical pollution has intensified the need for a change in fuel composition. In Japan, the amount of lead and octane in gasoline was reduced by half in Aug. 1970. The Council for Industrial Structure urged that fuel becomes leadless with an octane rating of 95 for special cars and 88 for ordinary cars. The Central Anti-Pollution Measures Council felt that olefin and aromatic hydrocarbon contents of gasoline should be reduced, since these compounds cause photochemical smog. Sulfur and phosphorus content in gasoline affect exhaust gas cleaning equipment and should be reduced. Leadless gasoline is to be mandatory in April 1974, however, it could cause abrasion of the exhaust valve seat in older cars.

**28565**

**APTIC NO. 50854**

Takahashi, Takeo

AIR POLLUTION COUNTERPLAN AND PETROLEUM FUEL. *(Taikiosen taisaku kara mita sekiyukei nenryo no doko). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Tokyo, p. 77-89, 1973. (Presented at the Japan Society of Mechanical Engineers, Symposium on Energy Supply, 378th, Tokyo, Japan, April 19-20, 1973, Paper 7.)*

Sulfur oxides, dust, nitrogen oxides, hydrocarbons, carbon monoxide, and lead compounds are emitted by the burning of petroleum based fuels. Sulfur oxides and lead increase in direct proportion to the amount contained in gasoline. The other pollutants vary according to combustion equipment and operating variables. Sulfur content in fuel is regulated in Japan; however, because of a lack of supplies of low-sulfur fuel, desulfurization of exhaust gas, desulfurization of heavy oil, and desulfurization by gasification are being studied. Liquefied natural gas use is effective in reducing NOx. No-lead gasoline is being used increasingly. Control methods for automobile exhaust and regulations for reducing traffic are important to reduce pollution.

**28566**

**APTIC NO. 50646**

Tamplin, Arthur R.

OUR SOLAR ENERGY OPTIONS: PHYSICAL AND BIOLOGICAL. *California Univ., Livermore, Biomedical Div., Rept. TID-4500, UC-48, 25p., Jan. 2, 1973, 56 refs.*

NTIS: UCRL-51315

Physical and biological systems for the utilization of solar energy are discussed. Physical systems include the use of solar cells and the conversion of solar energy into electrical energy. Descriptions and examples of utilization include solar heat systems, solar homes, commercial systems, space solar cell systems, and marine thermal systems -- sea thermal gradients and sea solar heat plants. Algal and waste management biological systems are discussed. Photosynthetic conversion efficiency, maximum efficiency, and the efficiency of algal systems are compared. The use of waste as fuel, pyrolysis, catalytic reduction, methane production, and the algae-methane-algae systems are also reviewed.

**28567**

**APTIC NO. 50538**

Tsushima, Eiji, Hiroo Kikuchi, Katsunobu Sato, Tadahiko Takada, Hiromi Sarai, Satoru Takemichi, Eizo Ishiyama, and Mitsuyuki Sasaki

MEASUREMENTS OF EXHAUST GASES FROM CERAMIC FACTORIES IN HOKKAIDO DISTRICT AND IMPROVEMENTS IN COMBUSTION ENGINEERING. *(Donai yogyo kojo ni okeru haigasu no sokutei kekka to nensho gijutsu ni taisuru kaizen jiko). Text in Japanese. Hokkaidoritsu Kogyo Shikenjo Hokoku (Rep. Hokkaido Prefect. Ind. Exp. Stn.), no. 203:1-8, Feb. 1973.*

Exhaust gases were measured at 19 ceramics factories in Hokkaido. The air ratio was generally too high in tunnel furnaces which caused lower fuel heat efficiency. The ratio should approach unity by proper adjustment of the air supply. With inversed flame square furnaces, the air ratio was too small which resulted in the discharge of smoke. Proper resistance should be kept in these furnaces against the passage of air. The smoke exhaust from tunnel furnaces was generally small. However, smokes were sometimes discharged when the quality of heavy oil was poor or the control of combustion not satisfactory. Smoke discharge from inversed flame square furnaces differed depending on the efficiency of combustion at each factory; generally a large amount of smoke was discharged from this kind of furnace. The sulfur oxide content in the exhaust gas from tunnel furnaces was usually small because of dilution by external air used for cooling. The SOx content was below emission standards. Combustion must be further improved to meet new smoke and dust standards. Two-step combustion or the use of a dust collector is preferable; however, none of the surveyed factories use these methods at present.

**28568**

**APTIC NO. 50451**

Wahnschaffe, E.

THE FORMATION OF OXIDES OF NITROGEN AT THE COMBUSTION OF HEAVY FUEL OIL. *(Die Bildung der Stickstoffoxide bei der Verbrennung von schwerem Heizoel). Text in German. VGB Kraftwerkstechnik, 53(4):213-218, April 1973. 6 refs.*

Development and properties of the oxides of nitrogen in an oil- fired boiler plant are discussed. The formation of nitric oxide and nitrogen oxide in such boilers is linearly dependent on the boiler load and the oxygen concentration of the combustion gases; the total concentration is dependent on the conduction of the combustion processes. The concentration of NOx is also dependent on the residence time but can be little influenced. The reduction of the NO2 to NO can be analytically studied up to 600 C. In the temperature range between 500 and 150 C the balance between NO and NO2 does not shift markedly towards NO2 because secondary reactions with primarily the oxides of sulfur cause a back reaction. The wet chemical methods by Saltzmann were selected for the analyses. Modification of the familiar method was necessary because of interference by the SOx. With the presence of water vapor in the flue gas sample, the conversion reaction was greatly accelerated as was the reaction of SOx with NO2. It was necessary to separate the water during sampling.

**28569** **APTIC NO. 50870**

Wendell, R. E., J. E. Norco, and K. G. Croke

EMISSION PREDICTION AND CONTROL STRATEGY: EVALUATION OF POLLUTION FROM TRANSPORTATION SYSTEMS. *J. Air Pollution Control Assoc., 23(2):91-97, Feb. 1973. 9 refs.*

A total systems approach in analyzing alternatives such as parking restrictions, staggered work hours, promotion of mass transportation, commuter taxes, and gasoline rationing is presented. The approach is illustrated with data from an analysis of the Chicago area. The total systems approach is based on the development of a vehicle model and an urban transportation model. The vehicle emissions model, which takes a new approach to vehicle emissions by distinguishing hot and cold vehicle operation is reviewed. Such an approach is important, since by 1975 it is expected that new cars will emit 85% of their carbon monoxide and hydrocarbons during cold operation. The method of integration of the vehicle emissions model to an urban model is also discussed and illustrated. The combining of the models into an emission simulation technique and subsequent policy evaluation of urban emission reduction strategies is illustrated.

**28570** **APTIC NO. 50546**

Yamada, Tsuyoshi

TECHNOLOGY OF PREVENTING THE EXHAUST OF NITROGEN OXIDES. *(Chisso sankabutsu haishutsu boshi gijutsu ni tsuite). Text in Japanese. Preprint, Ministry of International Trade and Industry, Tokyo (Japan), Public Nuisance Resources Research Inst., p. 46-58, 1973. 11 refs. (Presented at the Public Nuisance Resources Research Institute Research Seminar, 2nd, Tokyo, Japan, Oct. 4, 1972.)*

Removal and prevention of nitric oxide in combustion gases is difficult. The nitrogen oxide sources, mechanism of NOx formation, and NOx prevention technology are discussed. Nitrogen oxide sources include combustion furnaces, nitric acid manufacturing, adipic acid-terephthalic acid manufacturing, and nitration kettles. Nitrogen oxides have increased from 1965 to 1970 as 9.7, 11.7, 16.0, 11.4, 18.1, and 14.9 pphm. The higher the temperature and the higher the oxygen concentration, the higher the equilibrium concentration of NOx. The rate of NO formation can be expressed by d(NO)/dt equals ka(N2)(O2) kb(NO)squared.

**28571** **APTIC NO. 50934**

Yamamoto, Kenichi

COUNTERPLAN AGAINST EXHAUST GAS FROM A ROTARY ENGINE. *(Rotari kikan no haishutsu gasu taisaku). Text in Japanese. Nippon Kikai Gakkai-shi (Journal of the Japanese Society of Mechanical Engineers) (Tokyo), 76(653):603-609, May 1973. 6 refs.*

The rotary engine is a kind of intermittent combustion type internal combustion engine; therefore it does not differ from the reciprocating piston engine in terms of the mechanism of the generation of exhaust gas. However, the special shape of the combustion room and its turning make a difference in the gas characteristics. It is also more adaptable to control equipment for exhaust gas than reciprocating piston engines. The exhaust gas from rotary engine contains more hydrocarbons than a reciprocating piston engine, but contains less nitrogen oxides. Improvement of the combustion room, delay of ignition, and exhaust gas recirculation can be used to reduce emissions. The amount of HC from rotary engines having a large combustion room is close to that of the reciprocating piston engine. The fuel ejection method would improve rotary engine exhausts. Thermal reactors can also be used on rotary engines.

**28572** **APTIC NO. 50486**

Zanker, Adam

NOMOGRAPH FOR COMBUSTION EFFICIENCY AND AIR-TO-FUEL RATIO CALCULATION. *Erdoel Kohle (Hamburg), 26(1):37-38, 1973. 1 ref.*

A nomograph is presented for calculating the combustion efficiency and air-to-fuel ratio on the basis of carbon dioxide and oxygen content in flue gases. The nomograph allows one to perform these calculations in a couple of seconds using one movement of a ruler. An example is given.

**28573** **APTIC NO. 50956**

Zeilinger, Klaus

DYNAMOMETER FOR THE EXAMINATION OF AUTOMOBILE EXHAUSTS OF OTTO ENGINES AT NONSTATIONARY OPERATING CONDITIONS. *(Pruefstand zur Untersuchung der Abgase von Ottomotoren bei instationaeren Betriebszustaenden). Text in German. Automobiltech. Z. (Stuttgart), 75(5):182-187, 1973. 6 refs.*

Whether the optimum values for lambda and the ignition time during stationary and nonstationary operating conditions are optimum was examined. First the optimum values for lambda and ignition time for stationary operation were found. The engine adjusted to optimum operation during stationary conditions was then accelerated and decelerated on a dynamometer. The functions of all measurement parameters dependent on time, particularly of lambda and of the point of ignition (basic functions) were then determined. In addition, the pollutants were continuously measured. By superimposing correcting functions on these basic functions for lambda and the ignition time, new functions were obtained which deviate from the optimum basic functions for stationary operation. A new acceleration and deceleration sequence with the new functions yielded different exhaust gas concentrations, gasoline consumptions, average pressures, and ignition times. By selecting differing correcting functions, information can be obtained on the best lambda and ignition time for the respective acceleration and deceleration. The experimental set up used for examining the nonstationary operation is described. A water cooled four-cylinder Otto engine with electronic gasoline injection and transistor ignition was used for the experiments. The dependence of the gasoline consumption, the average pressure of hydrocarbons, carbon monoxide, and nitric oxide on lambda and ignition timing for 2000 rpm and average load is shown in five graphs. The NO values have a maximum of lambda values producing a minimum gasoline consumption, CO, and HC. The tests with nonstationary operation are still under way so that no final results are given. However, a graph is given showing the dependence of the injection volume the ignition time, and the rpm on the throttle valve position alpha; another graph indicates the air throughput.

## 1972

**28574** **APTIC NO. 50494**

Yamaguchi Prefecture (Japan), Research Inst. of Health; Yamaguchi Prefecture (Japan), Section of Public Nuisance; and Shimonoseki Municipal Government (Japan), Public Nuisance Section

RESULTS OF HARMFUL GAS SURVEY AT A WASTE COMBUSTION PLANT IN SHIMONOSEKI CITY. *(Shimonoseki shi A seiso kojo ni okeru yugai gasu chosa seiseki ni tsuite). Text in Japanese. Yamaguchi-ken Eisei Kenkyusho Nenpo (Ann. Rept. Yamaguchi Prefect. Res. Inst. Health), no. 14:78-80, Aug. 1972.*

The stack gas from two incinerators with a 90 tons/day capacity was analyzed for hydrogen chloride, nitrogen oxides, sulfur dioxide, ammonia, and formaldehyde emissions. The gas was cooled to 300 C with a water spray and passed through a separator and multicyclone dust collector. The HCl and HCHO concentrations were less than the emission standards prescribed by the Yamaguchi Prefectural regulations. Sulfur dioxide and ammonia were also low. Pollutant concentrations were reduced during the water spraying because the dust was moisturized and adsorbs and neutralizes HCl and SO2. The emissions depended on the composition of the wastes burned in the incinerator.

**28575** **APTIC NO. 50574**

PEDCo-Environmental Specialists, Inc., Cincinnati, Ohio

STATEWIDE INVENTORY OF AIR POLLUTANT EMISSIONS. STATE OF OHIO. *Environmental Protection Agency Contract 68-02-0044, Task Order 2, Rept. PEDCo-72-1, APTD-0756, 101p., Jan. 14, 1972. 46 refs.*

NTIS: PB 214977

An emission inventory was conducted in Ohio to determine the air quality and emissions of particulates, sulfur oxides, nitrogen oxides, carbon monoxide, and hydrocarbons for 1970. The major source categories included fuel combustion through domestic heating, institutional and industrial fuel usage, and steam-electric power generation; industrial process losses; solid waste disposal through open burning and incineration; and transportation sources, including motor vehicles, railroads, aircraft, vessels, and emission associated with gasoline handling. Data are tabulated for each specific region of the state.

**28576** **APTIC NO. 50516**

Alamanni, U., G. Bo, A. Maida, G. Marranci, and S. Pettinato

PRELIMINARY RESULTS OF AIR POLLUTION MONITORING IN WORK AREAS OF A PETROCHEMICAL PLANT IN NORTHERN SARDINIA. *(Primi risultati di indagini sull inquinamento atmosferico delle aree di lavoro di un complesso petrolchimico ubicato nella Sardegna Settentrionale). Text in Italian. Riv. Ital. Igiene (Pisa), 31(1-2):58-78, 1972. 10 refs.*

Work areas were studied of ethylbenzol production (causing benzol pollution), isopropylbenzol production (benzol), styrol production (styrol), polystyrol production (styrol), tolulene production (benzol), steam cracking (hydrogen sulfide), ammonia (NH3), acrylic fiber production (acrylonitrile, isopropylbenzol), sodium chloride electrolysis (chloride), and toluol dealkylation (benzol). Of 1032 tests performed at 1.5 m above the ground, 56 or 5.43% exceeded U. S. maximum permissible concentrations (M.A.C.). Of 46 tests in the ethylbenzol area, 17 or 36.96% exceeded the M.A.C. In the isopropylbenzol department 10.9% tests exceeded M.A.C., and in the polystyrol department 14.89 and 19.14% tests exceeded M.A.C. In styrol production 1.69% tests exceeded M.A.C., in steam cracking and in acrylic fiber production no test exceeded M.A.C., in NaCl electrolysis 2.85% tests exceeded M.A.C., in the ammonia department 1.81, 5.43, and 3.57% tests exceeded M.A.C. in three different work areas. In toluol dealkylation 3.64 and 5.45% tests exceeded M.A.C. in two different work areas. Since all production is automated, workers are not present in the work areas except at times of programmed controls.

**28577** **APTIC NO. 50792**

Boback, M. W.

LOW COST INCINERATION UNITS FOR THE DISPOSAL OF WASTE GRAPHITE AND OILS. *Atomic Energy Commission, Div. of Operational Safety, Proc. AEC Pollut. Contr., Oak Ridge, Tenn., 1972, CONF-721030, p. 167-183. 3 refs. (Oct. 25-27.)*

Two low-cost units used for the incineration of waste graphite and oils generated in a uranium production facility are examined. Both units can operate continuously with low maintenance and low operating costs. Prior to the fabrication of these burners, scrap graphite was buried and used oil was stored in drums with a small amount used for dust control on dirt roads. Plant operation, waste composition, had unit design, operation, and emissions are reviewed. The graphite burner produces only a slightly visible stack discharge, with uranium in the effluent ranging within 0.15-8.3 mg/cu M. The oil burner produces an almost colorless stack gas, with uranium concentration within the specified limits for exposures of 40 hr/wk. (Author abstract modified)

**28578** **APTIC NO. 50813**

Bowman, Barry Roy

AN ANALYTICAL AND EXPERIMENTAL STUDY OF NITRIC OXIDE PRODUCTION IN THE PRIMARY ZONE OF A GAS TURBINE COMBUSTOR. *Washington State Univ., Pullman, Dept. of Mechanical Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1972, 267p. 48 refs.*

The relative effects of turbulent mixing and chemical kinetics in the primary zone of a gas turbine combustor were investigated. A conical jet stirred reactor was chosen for experimental simulation of the primary zone and operated at pressure levels of 0.25, 0.395, and 0.92 atmosphere burning premixed methane and air. Data were collected near blowout conditions for equivalence ratios from 0.8 to 1.3. Measurements were made of the reactor temperature, nitric oxide mole fraction in ppm. The oxygen mole fraction as the mass flow rate was systematically varied. Gas samples were collected through an aerodynamic quenched quartz probe, and concentrations of NO and O2 were determined on an infrared NO analyzer and a process oxygen monitor. A comparison of the data was made with solutions to the governing equations for a perfectly stirred reactor and a 23-step kinetic mechanism for the combustion of methane and the production of nitric oxide. A one-parameter mixing model was incorporated to fit the data. Calculations were done using a modified Newton Raphson technique. Mixing was important at all pressures for low feed rated in the reactant jet. The NO concentrations were underpredicted by the PSR calculations. (Author abstract modified)

**28579** **APTIC NO. 50710**

Fish, A. D.

AIR POLLUTION FROM DIESEL VEHICLES. *Clean Air, 6(4):70-74, Nov. 1972. (Presented at the Clean Air Conference, Auckland, New Zealand, March 1972.)*

The causes of diesel exhaust smoke and various measuring instruments and techniques are examined, and legislation and standards controlling diesel exhaust smoke emissions are reviewed. Visual assessment, filter type smokemeter, and light obscuration measuring techniques are described. The consequences of California's proposed restrictions on emissions of nitrogen oxides, hydrocarbons, and carbon monoxide from diesel vehicles are considered. The diesel engine is capable of meeting all the particulate emission standards that have been formulated to date and reasonable standards can be maintained throughout its life if due attention is given to inspection and maintenance.

**28580** **APTIC NO. 50640**

Gilbert, R. R., G. E. Heuer, E. H. Jacobsen, E. B. Kuhns, L. J. Lawson, and W. T. Wada

FLYWHEEL DRIVE SYSTEMS STUDY. FINAL REPORT. *Lockheed Missiles and Space Co., Sunnyvale, Calif., Ground Vehicles Systems, Office of Air Programs Contract 68-04-0048, LMSC-D246393, APTD-1182, 293p., July 31, 1972. 10 refs.*

NTIS: PB 213342

The flywheel hybrid drive concept was investigated as a technically feasible way to power full size automobiles. A theoretical computer analysis of predicted emissions from the flywheel drive system, contrasted with emissions theoretically predicted for a conventional three-speed automatic transmission drive, indicated some emission reduction. The flywheel drive was assumed to have an oxidation catalyst and exhaust gas recirculation (a nitrogen oxides catalyst was not assumed), and the conventional system was assumed to have the same emission controls. A flywheel ancillary equipment design study was also included.

**28581** **APTIC NO. 50507**

Grassmann, P.

WHAT TO DO WITH WASTE HEAT? (Wohin mit der Abwaerme?). Text in German. Preprint, Eidgenoessiche Technische Hochschule, Zurich (Switzerland), 24p., 1972. 32 refs. (Presented at the Conference of Process Engineering, Annual, Cologne, West Germany, 1972.)

Because of the good cooling effect of flowing water, it is preferably used by power plants and chemical plants for cooling large quantities of waste heat. But the thermal pollution of water bodies is gradually approaching a critical stage so that as an alternative the enormous waste heat quantities must be released into the atmosphere from cooling towers. The following possibilities for the cooling of waste heat are available: the wet cooling tower with direct contact between water and air and the use of evaporation with naturally or artificially produced air flow, the dry cooling tower with the heat transfer of cooling water to air through a separating wall (mostly with artificially produced airflow, and the air cooler with transfer of heat through a wall and cooling lagoons. The waste heat released via all these cooling systems is still higher than the atmospheric temperature. The possibilities of recycling waste heat for preheating purposes (for instance at the cement production) are limited. Its use for remote heating is uneconomical if long distances must be covered. The release of waste heat into the atmosphere did not yet lead to any measurable thermal pollution of the atmosphere. But with the present and future power demand in mind, a rise of the ambient temperature seems to be indispensable. However, even an increase of the body temperature by only 1% from 37 to 40 C is acceptable. The problem can be solved by starting to use solar energy.

**28582** **APTIC NO. 50832**

Hare, Charles T. and Karl J. Springer

EXHAUST EMISSIONS FROM UNCONTROLLED VEHICLES AND RELATED EQUIPMENT USING INTERNAL COMBUSTION ENGINES. FINAL REPORT. PART I. LOCOMOTIVE DIESEL ENGINES AND MARINE COUNTERPARTS. *Southwest Research Inst., San Antonio, Tex., Emissions Research Lab., Office of Air and Water Programs Contract EHS 70-108. APTD-1490, AR-845, 79p., Oct. 1972. 24 refs.*

NTIS: PB 220398

Exhaust emissions from three locomotive diesel engines were measured, including: total hydrocarbons by heated flame ionization analysis; light hydrocarbons by gas chromatography; carbon monoxide, carbon dioxide, and nitric oxide by nondispersive infrared spectrometry; nitric oxide and nitrogen oxides by chemiluminescence; oxygen by electrochemical analysis; and total aliphatic aldehydes and formaldehyde by MBTH and chromotropic acid methods, respectively. In addition, smoke plume opacity was measured using a special version of the PHS smokemeter, and an attempt was made to characterize particulates using an experimental dilution-type sampling device. The engines tested were SP Unit 1311, an EMD12-567 switch engine; SP Unit 8447, an EMD 16-645E-3 line-haul engine; and SP Unit 8639, a GE 7FDL16 line-haul engine; and they were all operated in modes representative of real operation. For test purposes, the engines were loaded by absorbing power from their main generators using the Southern Pacific SEARCH machine facility, and all pertinent operating data were recorded. In addition to mass emissions computed from tests performed, other available data was used where possible in estimating emission factors and national impact. (Author abstract)

**28583** **APTIC NO. 50645**

Honea, F. I.

DISPOSAL OF WASTE EXPLOSIVES. *Atomic Energy Commission, Div. of operational Safety, Proc AEC Pollut Contr. Conf. Oak Ridge, Tenn., 1972, CONF-721030, p. 221-241. 13 refs. (Oct. 25-27.)*

The progress made in the fields of incineration and biological degradation of explosives in order to eliminate the present practice of open burning of explosives is reviewed. The development and operation of two new incinerator models are described, and the concept of biodegradation is discussed. Preliminary test runs indicated the feasibility of the closed-pit incinerator concept for use in burning waste explosive materials. Tests to finalize design parameters for a prototype incinerator will include a modified, reinforced door, added dirt layer thickness, and a pressure regulator to decrease the chamber pressure. The adaptation of bacteria and alage to explosives as a food will be tested with a laboratory-scale pilot plant recycle system. The new methods reduce emissions of carbon monoxide, nitric oxide, odors, and other pollutants.

**28584** **APTIC NO. 50694**

Kramer, Hans

EMISSION INVENTORY FOR RESIDENTIAL HEATING. *In: Lufthygiensch- meteorologische Modelluntersuchung in der Region Untermain. 4. Arbeitsbericht. Regionale Planungsgemeinschaft Untermain, Frankfurt am Main (West Germany), p. 91-95, Oct. 1972.*

For an emission inventory for domestic heating the following were surveyed: location of the emission area, mean elevation of the area, mean geometric height of the sources, and maximum heat demand per hour for solid, liquid, and gaseous fuels. The temporal fuel demand was calculated from the using time of the heater, the heat demand, lower heating value, and degree of efficiency of the heaters. The average number of heating hours for various buildings was determined. The quantity of fuel consumption during the year for heaters was determined by means of the degree of use per day. As pollutants for domestic heaters and commercial firing systems, the particulate concentration and sulfur dioxide concentration in kg/t were included in the calculation. The calculations were carried out by a computer.

**28585** **APTIC NO. 50693**

Lamp, W.

STATUS OF THE INVESTIGATIONS OF THE EMISSION INVENTORY OF THE DENSELY POPULATED AREA OF LOWER MAIN REGION. *In: Lufthygienish-meteorologische Modelluntersuchung in der Region Untermain. 4. Arbeitsbericht. Regionale Planungsgemeinschaft Untermain, Frankfurt am Main (West Germany), p. 82-90, Oct. 1972. 3 refs.*

The emission inventory which is to be worked out for the Lower Main Region near Frankfurt will have three parts, one inventory on industrial emissions, one on emissions from domestic heating, and one on traffic emissions. For the industrial emission inventory 800 questionnaires were mailed out of which nearly 70% were returned. For the emission inventory for domestic heaters the heat demand per hour was determined per area unit separately for solid, liquid, and gaseous fuels. From these data the sulfur dioxide can be calculated by means of stoichiometric equations. The traffic emission inventory is expected to pose the greatest difficulties. These emissions are determined by means of the average speed of automobiles and the number of kilometers covered by all automobiles in the area. The emission of an automobile at certain speeds can be measured on a dynamometer. Such data are already available. It is expected that the automobile emission inventory will be completed in 1973.

**28586** **APTIC NO. 50475**

Lenhart, K.

SULFUR COMPOUND EMISSIONS. EVOLUTION OF EMISSION VOLUMES IN WEST GERMANY SINCE 1960. *(Die Emission von Schwefelverbindungen. Die Entwicklung von Emissionsmengen in der Bundesrepublik Deutschland seit 1960). Text in German. (VDI Deut. Ingr.) Ber., no. 186:1-62, 1972. 152 refs.*

The balance of sulfur dioxide emissions from all possible sources in West Germany is drawn for the 1960-1970 period on the basis of regular emission measurements. The total amount of sulfur emissions into the atmosphere was calculated to be 1,800,000 tons equaling 3,600,000 tons of SO2 in 1970. The respective contributions to the SO2 emissions by combustion equipment, sulfuric acid production plants, Claus equipment, nonferrous metallurgical plants, ore agglomeration plants, and the rest of the industrial processes, including industrial waste incineration, were 93.8, 0.8, 0.4, 0.2, 4.2, and 0.6% in 1970, against 90.5, 1.7, 0.7, 0.2, 6.3, and 0.6% in 1960. The shares of industry, domestic heating, and traffic were 76%, 20%, and 4%, respectively, in 1970. Compared to the 1960 level, the combined sulfur emission rose by 16%, while the rates of increase in industrial output and fuel consumption were 74 and 61%. The share of industry rose from 70 to 76%, while the contributions by domestic heating and traffic fell from 22.5 to 20%, and from 7 to 3.5%, respectively. The total amount of sulfur present in fuels, ores, sulfuric acid, and in the form of elementary sulfur was 4,500,000 tons in 1970, of which 1,800,000 tons or 40% were emitted into the atmosphere, while the rest was disposed of in a liquid or solid form in the environment.

**28587** **APTIC NO. 50447**

Macskasy, A.

REMOTE HEAT SUPPLY - ALSO A METHOD FOR PROTECTING THE ENVIRONMENT. *(Fernwaermeversorgung - auch ein Weg zum Schutz der Umwelt). Text in German. VDI (Ver. Deut. Ingr.) Ber., no. 184:19-30, 1972. 19 refs.*

The extent of air pollution in the city of Budapest is discussed on the basis of recent measurements of sulfur dioxide aerosol, and dust fallout. For 1970 an average SO2 emission of 20 kg/sec occurred. The average ground-level emission concentration was 0.8 mg SO2/cu m, the maximum concentration was 2.0 mg SO2/cu m. These values exceeded the maximum allowable concentration. A comparison of the annual temperature characteristic and the SO2 level shows that the latter is pretty much a mirror image of the temperature, which points to the prominent role of heating and heat supply. During the coldest period of the year, 72% of the air pollution is caused by heaters, the remaining 28% is caused by industry and traffic. The factors important for the dilution of air pollutants such as wind velocity and direction and temperature gradient are briefly discussed. In Hungary, soft coal and briquettes are still used as fuels for heating. Hungarian soft coal has a carbon concentration of 27 to 51%, a sulfur concentration between 1 and 4%, and an ash concentration of 12 to 40%. Hard coal has a somewhat lower sulfur content but the ash concentration is considerably higher. The heating value is low so that more coal must be fired to obtain a certain amount of heat. The main task for eliminating air pollution thus would be the replacement of old heating systems by remote heating, or by gas heaters. A stack height of 300 m is required in Budapest for rapid dilution of the pollutants emitted by large remote heating plants. Furthermore, the installation of modern electrostatic precipitators and the use of nuclear power plants will be required to reduce the present air pollution to a noticeable extent.

**28588** **APTIC NO. 50750**

Nishikawa, Sakura

STOKE TYPE REFUSE FURNACE. *(Sutokashiki jinkai shokyakuro). Text in Japanese. (Nippon Puraipuriko Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-41571. 3p., Oct. 20, 1972. 1 ref. (Appl. July 5, 1963, 1 claim).*

The design for a modified incinerator for the complete combustion of refuse is presented. The furnace is upright, with a drying chamber directly connected to the feed port; a combustion chamber below the drying chamber; a stoker along the bottom of the chamber; a damper; and an upright flue connected to a horizontal stack. The refuse is dried prior to combustion, and the damper adjusts the flue opening depending on the combustibility of the refuse.

**28589** **APTIC NO. 50802**

Puricelli, Remo

ANL STEAM PLANT CONVERSION. *Atomic Energy Commission, Div. of Operational Safety, Proc. AEC Pollut. Contr. Conf., Oak Ridge, Tenn., 1972, CONF-721030, p. 43-50. (Oct. 25-27.)*

The problems involved in the conversion of a coal-fired steam plant with auxiliary gas burners to an alternate firing method to comply with air pollution regulations are reviewed. The original conversion approach included installation of gas burners for main fuel and light oil burning equipment with minimum storage capacity as immediate stand-by. When the gas supply was discontinued, however, the plant was forced to examine other alternatives, including low-sulfur coal usage with added controls through wet scrubbing, electrostatic precipitators, filters, and alkaline additive cleaning; usage of liquid petroleum gas as the major fuel with oil as stand-by; and conversion to oil-firing. The conversion of the plant to multi-grade oil firing proved the most dependable and economically feasible approach.

**28590** **APTIC NO. 50641**

Smil, Vaclav Josey

ENERGY AND THE ENVIRONMENT: A LONG RANGE FORECASTING STUDY. *Pennsylvania State Univ., University Park, Dept. of Environmental Sciences, Thesis (Ph.D.). Ann Arbor, Mich., Univ. Microfilms, Inc., March 1972, 272p. 246 refs.*

A long-range forecasting study of the future of energy and the environment is presented. The Delphi method was used in the study, in which forty experts from seven nations participated in three rounds of questioning lasting about a year. Results are provided in four separate areas of interest. Long range probability forecasts were obtained for 30 energy production, transmission, and transportation technologies, and 31 environmental protection, planning, and management innovations. Percentage probabilities of five environmental episodes -- urban air pollution, power supply failure, jumbo tanker wreck, offshore drilling oil spill, nuclear radiation contamination -- were estimated for the 1970 decade. A relative ranking of the 25 most important energy-environment problems was established by the Delphi procedure, and future growth limits of 17 contemporary technologies were forecast by the energy systems experts. Trends in power generation (nuclear, fossil fueled, and steam) and environmental factors (sulfur dioxide, nitrogen oxides, particulates, carbon dioxide, heat, and radiation) are discussed. Trends and developments in oil, natural gas, and other fuels are mentioned. (Author abstract modified)

**28591** **APTIC NO. 50838**

Toca, Frederick Mervin

LEAD AND CADMIUM DISTRIBUTION IN THE PARTICULATE EFFLUENT FROM A COAL-FIRED

*BOILER. Iowa Univ., Iowa City, Dept. of Preventive Medicine and Environmental Health. Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., July 1972, 173p. 134 refs.*

Lead, cadmium, and beryllium distribution in the particulate effluent from a coal-fired boiler were evaluated. Particular attention was given to the concentrations and amounts of these elements in the respirable size range. A method of size selective sampling was developed to collect and separate the particulate size fractions from the emission source. This method consisted of a stack sampling train made up of a miniature cyclone, a six stage Andersen Sampler, and an inline membrane filter. The sampling train separated the particles according to their aerodynamic equivalent diameters, paralleling the mechanisms involved in particulate removal and retention in the respiratory tract. The various particulate size ranges were analyzed for lead, cadmium, and beryllium qualitatively and semiquantitatively using emission spectroscopy and neutron activation analysis. They were also analyzed for cadmium and lead using atomic absorption and for beryllium using fluorescence emission spectroscopy. The highest concentration of cadmium and lead were in the smaller particle size ranges. A definite increase in lead concentration with decreasing particle size was shown. The samples for cadmium also showed an average tendency to increased concentration with decreasing particle size, but the increase was not as great in the smallest size fractions. The data for beryllium indicated that there was not an increased concentration in the smaller particulate size fractions.

**28592** **APTIC NO. 50625**

Welsh, H. W., J. L. Harp, Jr., R. A. Yano, T. P. Oatway, C. T. Riley, and L. Nawroczynski

STUDY OF LOW EMISSION VEHICLE POWER PLANTS USING GASEOUS WORKING FLUIDS. (FINAL REPORT). *Thermo Mechanical Systems Co., Canoga Park, Calif., Office of Air Programs Contract EHSH 71-003, Rept. SR-20, APTD-1226, 354p., Aug. 1972. 60 refs.*

NTIS: PB 220148

Low-emission vehicle powerplants using gas as the powerplant working fluid were evaluated. The thermodynamics and cycle design were investigated for the external combustion piston engine, the closed and open Brayton cycle engine (gas turbine), the Ackeret Keller cycle powerplant, the Stirling cycle engine, and the Rankine cycle engine (steam engine). Emission data on carbon monoxide, unburned hydrocarbons, and nitrogen oxides; efficiency at full and part load; powerplant weight and volume; operating principles and characteristics; automotive design, installation, and operation; and cost parameters were examined. The combustive, explosive, and toxic characteristics of the gaseous fluids were studied.

**28593** **APTIC NO. 50713**

Yamamoto, Tamechika

ENVIRONMENTAL POLLUTION AND SYSTEMATIZATION OF CHEMICAL TECHNIQUES--USE OF METHANOL AS FUEL. *Chem. Economy Eng. Rev., 4(12):52-55, 57, Dec. 1972.*

A Japanese electric power company reportedly plans to use low-cost imported methanol as a fuel for power stations. If the plan materializes, it will open the way for the use of this pollution-free energy source in other applications including the production of hydrogen for fuel-oil desulfurization and hydrocracking. Alkylation of the butane produced as a by-product of hydrocracking is a major source of the highly branched isoparaffin which must be added to lead-free gasoline to improve its octane rating. Other potential uses of methanol are as a source of hydrogen for fuel cells generating town gas, as a boiler fuel, as a gasoline additive to reduce carbon monoxide and hydrocarbon concentrations in exhaust gas, and as a reducing gas in the steel and metallurgical industries. Though fluidized bed boilers have not yet been developed, low-temperature burning of methanol in a fluidized bed would effectively reduce nitrogen oxides in waste gas. The hydrogen obtained through steam reforming of methanol can be purified by a pressure swing adsorption process and used in a fuel cell containing an alkaline electrolyte solution.

## 1971

**28594** **APTIC NO. 50957**

Environmental Protection Agency, Research Triangle Park, N. C., Air Pollution Control Office

PHOTOCHEMICAL OXIDANTS AND AIR POLLUTION: AN ANNOTATED BIBLIOGRAPHY PART I, II. *Pub-AP-88, 153p., March 1971. 1900 refs.*

GPO

This bibliography contains about 1900 abstracts. The documents were collected from many sources from recent literature (1959-1970). Some documents are from the early part of this century. The bibliography contains the literature on photochemical oxidants in relation to air pollution. Abstracts are arranged in the categories listed on the contents page of the bibliography. Each abstract is designated by its Air Pollution Technical Information Center APTIC accession number. An author index, a title index, a subject index, and a geographical location index are included. Subjects include emission sources; atmospheric interaction; measurement methods; control methods, effects on human health, plants and livestock, materials, and economics; air quality measurements, legal and administrative, standards and criteria, basic science and technology, and social aspects.

**28595** **APTIC NO. 50575**

Devitt, Timothy W.

STATEWIDE INVENTORY OF AIR POLLUTANT EMISSIONS. STATE OF KANSAS. *PEDCo-Environmental Specialists, Inc., Cincinnati, Ohio, Environmental Protection Agency Contract 68-02-0044, Task Order 4, Rept. PEDCo-72-2, APTD-1131, 86p., Dec. 31, 1971. 24 refs.*

NTIS: PB 214911

An air pollutant emission inventory was conducted in Kansas to determine the amount of particulates, sulfur dioxide, nitrogen dioxide, carbon monoxide, and hydrocarbons emitted in the state for 1970. The major emission sources studied included fuel combustion through residential heating, commercial and institutional fuel usage, and steam-electric power generation; industrial process losses; solid waste disposal through incineration and open burning; transportation sources, including motor vehicles, aircraft, railroads, vessels, and fuels handling and evaporation; agricultural burning; and solvent losses. Data are tabulated by point and area sources within specified regions.

## 1969

**28596** **APTIC NO. 50807**

Morita, Clyde B.

PHOENIX-TUCSON METROPOLITAN AREA AIR POLLUTANT EMISSION INVENTORY. *National Air Pollution Control Administration, Durham, N. C., Div. of Air Quality and Emission Data, APTD-0827, 53p., Oct. 1969. 13 refs.*

NTIS: PB 207696

The purposes of this study are to establish the magnitude and sources of air pollutant emissions in the Phoenix-Tucson area for incorporation into a national emission baseline, and to use the emission estimates in a diffusion model to establish the relative extent of air pollution in the area. These data are used as the basis of the engineering evaluation in the designation of an air quality control region for the area. The estimated annual emissions are 2,068,000 tons of sulfur oxides, 34,300 tons of particulate matter, 535,000 tons of carbon monoxide, 125,000 tons of hydrocarbons, and 62,400 tons of nitrogen oxides. The air pollution problem in the urbanized area is mainly automotive in nature. The eight copper smelters release thousands of tons of sulfur oxides in the rural areas. Pollutant emissions by various sources such as transportation, agricultural fuel combustion, solid waste disposal, industrial processes, and solvent evaporation, are listed.

### 1966

**28597** **APTIC NO. 50626**

Thompson, Robert Nathan

**VEHICLE TIRE RUBBER AS AN AIR POLLUTANT.** *Oklahoma Univ., Oklahoma City, Dept. of Health Sciences, Thesis (Ph.D.), Univ. Microfilms, Inc., 1966, 93p. 69 refs.*

The objectives of this study are to determine if rubber dust prepared from a usual commercial rubber formulation and deposited by inhalation in significant amounts in the lungs of various species of animals can be affected by the inhalation of the exhaust gases of automobiles, thus causing elution of polycyclic aromatic hydrocarbons resulting in tumor formation. It also seeks to determine if these dusts are significant occupational health hazards from the point of view of air pollution and carcinogenesis. A new instrumental technique capable of detecting vehicle tire rubber in a sample of roadway dust has been developed. This quick, reliable and extremely sensitive procedure combines the expendiency of pyrolysis and the versatility of gas-liquid chromatography to volatilize and separate for identification the organic components of roadway dust. The methods are readily adaptable to the detection of other non-volatile particulate pollutants which might invade the atmosphere. This qualitative technique, with some modification and refinement can be developed as a quantitative method. Rubber tire degradation products definitely contribute to the pollution of environment. Particle size of the tire particles was measured.

### 1955

**28598** **APTIC NO. 50610**

Hedvall, J. A., S. Nordengren, and B. Liljegren

**ON THE THERMAL DECOMPOSITION OF CALCIUM SULFATE AT LOW TEMPERATURE.** *(Ueber die thermische zersetzung von kalziumsulfat bei neidrigen temperaturen). Chalmers Tek. Hoegsl. Handl., no. 158, 1955. Translated from German, 19p. (Complete text not available).*

The thermal decomposition of calcium sulfate (gypsum) at low temperatures was studied as a possible process for the production of sulfuric acid. A reaction temperature of 1000 C was used throughout. The materials and experimental procedure are reviewed. The effect of various starting materials, impurities in the raw materials, preliminary treatment of the reactant, and oxidizing and reducing atmospheres on the reaction mechanisms and rates and the yield was studied. In order to achieve high yields, the activity of the added quartz was increased by the addition of sodium chloride. For the reaction of gypsum with feldspar or kaolin, however, higher yields were obtained when no NaCl was added. The reaction velocity of the mixtures was increased by continuous removal of the gases formed in the decomposition. The removal of gaseous sulfur oxides was accomplished using steam. Yields were increased when the reactions were carried out in an oxidizing atmosphere.

## CONTROL METHODS

### 1973

**28599** **APTIC NO. 50440**

Tokyo Metropolitan Government (Japan), Bureau of Environmental Protection

**TEST RESULTS OF AUTOMOTIVE EMISSION REDUCTION DEVICES.** *(Jidosha haishutsugasu gensiosochi no tesuto kekka). Text in Japanese. 6p., Feb. 1973.*

Catalytic afterburner devices were tested on automobiles for 10,000 km of driving. The devices reduced carbon monoxide, hydrocarbons, and nitrogen oxides simultaneously. Engine modifications such as carburetor modifications were effective in reducing nitrogen oxides when NOx was reduced by a reduction and oxidation catalyst device. No catalyst loss was found. The efficiencies of several devices manufactured by Mitsui Mining and Smelting Co., Kobe Steel, and Hitachi, Ltd., are tabulated.

**28600** **APTIC NO. 50450**

Ministry of International Trade and Industry (Japan)

**A REPORT ON AN INVESTIGATION OF STACK GAS DESULFURIZATION SYSTEMS AND INSTALLATION PLANS.** *(Haien datsuryu sochi secchi jokyo oyobi secchi keikaku chosa kekka). Text in Japanese. 74p., Feb. 1973.*

There were 70 apparatuses for flue gas desulfurization with a capacity of 5.8 million N cu m/hr at the end of 1972. The total number of apparatuses was expected to increase to 138 and 183 at the end of 1973 and 1977, respectively. The total capacity will be reaching about 25 million N cu m/hr at the end of 1977. Among the 70 apparatuses in operation, paper and pulp industry had 24 apparatuses, followed by non-ferrous metal industries which had 13 apparatuses. More than 90% of the apparatuses were wet-type desulfurization equipment and the sulfur was recovered as ammonium sulfate, sulfuric acid, sulfur, or gypsum. These desulfurization plants are listed.

**28601** **APTIC NO. 50467**

**ROOFTOP DUST COLLECTOR FOR ELECTRIC FURNACES.** *(Denkiro lateya shujin setsubi). Text in Japanese. Tekko Kaiho (Bull. Japan Iron Steel Ind.), no. 968:4-5, Feb. 21, 1973.*

A rooftop dust collection system is described which is nearly 100% efficient. A hood can be provided over the electric furnaces, and a monitor can be provided over the roof to let heat out. The whole building can be sealed so that the smoke stays under the roof before it is let out, or this can be combined with the hood/monitor system. The hood-type system has the disadvantage that when too much dust is emitted it can escape through the roof monitor. The sealed-off system is economical, but the volume of smoke stored in the roof-top and the dust collector's suction must be well balanced. A monitor can be used with the sealed-off building to vary the draft when there is less smoke. A hood combined with the sealed-off building can trap most of the dust from the furnace, however, equipment costs are high. Bag filters and electrostatic dust collectors can be used. It is difficult to seal off the whole building completely, and disposal of the collected dust creates a problem.

**28602** **APTIC NO. 50468**

Soken Kagaku Co., Ltd.

**HIRT SOKEN COMBUSTION DEODORIZING EQUIPMENT.** *(HIRT Soken-shiki nensho dasshu sochi). Text in Japanese. Kagaku Sochi (Plant and Process), 15(3):93-96, March 1973.*

Hirt-Soken forced draft fume incinerator with a tube and shell heat exchanger can deodorize fumes generated by a resin reactor, fish meal processing effluents, and solvents. The special oil burner is equipped with a nozzle which turns oil into fine particles; this is equivalent to a gas burner, but is much cheaper. The system can be used for waste disposal from animal processing, printing, metal printing, asphalt processing, gasoline loading, and other industries.

**28603** **APTIC NO. 50483**

**REPORT OF SURVEY ON CONTAMINATION CONTROL BY QUESTIONNAIRE.** *(Kontaminesyon kontororu ni kansuru anketo chosa hokokusho). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 10(7):1-10, Jan. 1973.*

Fish processing, food, chemical, oil refinery, machine, electrical equipment, precision machinery, transportation, communication, and other industries were surveyed by questionnaires to find the level of contamination control. Only 10.1% of those questioned responded. About 58.5% of the responding firms had carried out contamination control, and 8.5% planned to do so. Air transportation, precision machinery, semi-conductor, pharmaceutical, and electrical equipment industries had carried out contamination control using clean rooms, clean booths, and clean benches. About 33% of the respondents had no contamination control because they felt it was unnecessary, had not got around to it, had no information on it, or felt it did not pay. Contamination control is usually applied in manufacturing processes, followed by assembling, examination, and cleaning processes. The firms wanted a Japanese standard on contamination control to outline a measurement method and to give concentration standards, especially on aerosols in the atmosphere.

**28604** **APTIC NO. 50864**

**AIR CLEANING IN FULLY AIR CONDITIONED BUILDINGS.** *(Luftreinigung in vollklimatisierten Gebaeuden). Text in German. Wasser Luft Betrieb, 17(5):158-159, 1973.*

Mechanical air filters for flow rates of more than 1 m/ ec with a pressure difference of less than 10 kg force/sq m are primarily used in air conditioning units for collection of the coarse dust. The efficiency of these filters drops markedly with atmospheric air pollutants of less than 10 micron. Aside from wet metal filters, coarsely textured fiber filters are increasingly coming into use for this purpose. For the collection of atmospheric dusts with grain sizes down to less than 1 micron, inorganic as well as natural or synthetic organic fibers of varying structure and density are used. These filters must be thrown away after they are filled with dust. In many cases a combination of coarse and fine filters is necessary for efficient dust removal. The terms collection efficiency, dust storage capacity, and filter life time, as well as volume flow and pressure difference are explained.

**28605** **APTIC NO. 50972**

**SULFUR DIOXIDE REMOVAL: PART I. IDEAL EXTRACTION ROUTE ELUSIVE.** *Can. Petrol., 14(2):36-39, Feb. 1973.*

North American fuel users have not been able to reduce sulfur dioxide emission levels. The results have been a rapid rise in the price of low-sulfur fuels. The U. S. market for imported Canadian heavy fuel oils has risen quickly this year to about 100,000 bpd. The present shortage is so severe that low-sulfur fuel oils have quickly established a price level 30% higher than medium to high sulfur products. Alberta has established ambient air quality standards for SO2 which limits its concentration to a maximum of 0.30 ppm over an 1-hour period and 0.10 ppm over any 24-hour period. Process plant fuels and steam boilers are the major sources of SO2 pollution. Sulfur appears in crude petroleum in a variety forms such as, hydrogen sulfide, mercaptans, polysulfides, and thiopenes. Much of this sulfur will eventually be released to atmosphere as SO2 if not removed during the refining process. Much of the sulfur in crude is removed in the refinery in the form of hydrogen sulfide in the standard Claus reactors. Little progress has been made towards the development of an efficient and economic SO2 scrubber system for small sources. Several methods have been proposed for the removal of SO2 from the stack gases from 300 MW stations or larger. The dry limestone injection process could be used at existing power plants with a minimum of capital investment and with very little interference with normal station operation.

**28606** **APTIC NO. 50423**

Abaseyev, V. K.

**THERMAL AND CATALYTIC TREATMENT OF WASTE GASES CONTAINING 3,4-BENZOPYRENE.** *(Termicheskoye i kataliticheskoye obezvrezhivaniye otkhodyashchikh gazov, soderzhashchikh 3,4-benzpiren). Text in Russian. Khim. Prom. (Moscow), no. 1:25-26, 1973. 3 refs.*

Thermal and catalytic combustion of 3,4-benzopyrene containing waste gases from bitumen and roofing material, e.g., ruberoid manufacturing plants is described. Such waste gases contain up to 1500 micrograms of 3,4-benzopyrene per 100 cu m, and also hydrogen sulfide, mercaptans, and other carcinogens such as 1,12-benzperylene, 1,2-benzoanthracene, and 1,2,3,4-dibenzoanthracene. Contact condensers proved not to be suitable for the removal of 3,4-benzopyrene-containing waste gases from the contact condenser are sent into the oil tar heating furnace where the waste gases are burned in a 1500-1700 C flame. The burned waste gas contains no 3,4-benzopyrene, hydrogen sulfide, or mercaptans, while the residual phenol and total organic content accounts for 10-20% and 0-25% of the initial values, respectively. Waste gases from another bitumen producing plant are incinerated on a two-layer catalyst, with the first layer being composed of 85.95% alumina, 8.6% copper oxide, and 5.45% chromium oxide, while the second layer is aluminosilicate containing 0.2% platinum. Complete removal of all organic contaminants, including 3,4-benzopyrene, phenols and mercaptans and H2S, is achieved at an operating temperature of 450-500 C. Ruberoid-manufacturing plant generated waste gases with high 3,4-benzopyrene and total organic content are purified by a platinum-containing aluminosilicate catalyst at a temperature of 360 C.

**28607** **APTIC NO. 50943**

Adolph, Manfred

**SHREDDING PROCESS, A NEW WAY OF SCRAP PREPARATION.** *(Shreddern, die neue Methode of Schrottaufbereitung). Text in German. Staedtehygiene (Uelzen/Hamburg), 24(4):88-95, 1973. 8 refs.*

A new method of scrap preparation is described along with shredding equipment and environmental control equipment. The shredder is preferably used for bulky wastes such as car bodies, kitchen ranges, refrigerators, washing machines, and steel furniture. It is not suitable for steel ropes or steel bars. The operation of all shredders, with one exception, is based on the principle of the hammer mill. Shredders are equipped with a separating system for non-ferrous metals and a dust collection system. The dust which has to be drawn off poses a particular problem. During the winter months the drawn off dust is wet and tends to agglomerate. Sparks from the shredding process should not damage the dust collection system. Sudden deflections of the dust flow are to be avoided because of the eroding effect of the steel dust particles. For dust collection in this particular case, a combination of a cyclone for preliminary dust collection followed by a wet collector proved most suitable. Presently 15 shredders are in operation in West Germany with a total throughput of about 390,000 tons/yr.

**28608** **APTIC NO. 50526**

*Ando, Eisaku*

**AN ADSORBENT.** *(Kyuchakuzai). Text in Japanese. (Sanko Chemical Industries, Ltd., Tokyo (Japan)) Japan. Pat. Sho 48-2116. 3p., Jan. 22, 1973 (Appl. Oct. 6, 1970, 1 claim).*

An adsorbent consisting of activated charcoal and hexamethylene tetramine is described which can be used to adsorb halogenated hydrocarbons, especially methyl bromide. The adhering of hexamethylene tetramine to the activated carbon can be carried out by dipping carbon into a solution of hexamethylene tetramine in water, filtering it, and drying it in an oven.

**28609** **APTIC NO. 50559**

Arashi, Norio and Takao Hishinuma

**EXHAUST GAS DESULFURIZATION EQUIPMENT.** *(Haigasu datsuryu sochi). Text in Japanese. (Hitachi, Ltd., Tokyo (Japan)) Japan. Pat. Sho 48-7184. 2p., March 3, 1973. 1 ref. (Appl. Nov. 24, 1970, 1 claim).*

Exhaust gas desulfurization using activated carbon to adsorb sulfur dioxide which can then be recovered as sulfuric acid is described. The adsorbed SO2 is removed from the activated carbon by water washing. The H2SO4 which forms is contacted to the gas going into the activated carbon layer for cooling and to be concentrated. Duplicate activated carbon-packed towers are previded -- one for SO2 adsorption and one for H2SO4 washing. The exhaust gas is not passed through the water-washing tower; the H2SO4 is concentrated by contacting the gas going into the activated carbon with H2SO4 under the activated carbon layer of the adsorption tower. The SO2 in the gas after gas-liquid contact is removed by another activated carbon-packed tower.

**28610** **APTIC NO. 50935**

Ariga, Motoi and Sadaharu Nakazawa

**GAS TURBINE AND STEAM CAR FROM STANDPOINT OF EXHAUST GAS POLLUTION.** *(Haiki kogai yori mita gasutabin oyobi joki jidosha). Text in Japanese. Nippon Kikai Gakkai-shi (Journal of the Japanese Society of Mechanical Engineers) (Tokyo), 76(653):610-618, May 1973. 12 refs.*

Before gas turbines can be used in cars, exhaust gas cleaning (especially nitrogen oxide reduction), heat exchanger development, reduction of costs, and rise of reliability are necessary. The emission of NOx is unavoidable because of the rise of pressure by the operation. In a boiler consisting of a first combustion area, second combustion area, and dilution area, the formation of NOx occurs mainly in the first and second areas. The higher the temperature of the overall area and the longer the retaining time of the combustion gas in each area, the greater the NOx formation. To reduce NOx formation, the temperature of combustion gas must be lowered as much as possible and the retaining time must be shortened. The steam engine car has been studied and tested. It gives 0.05% carbon monoxide, 20 ppm hydrocarbons, and 70 ppm nitrogen oxides. To reduce NOx formation, the temperature of combustion gas must be lowered as much as possible and the retaining time must be shortened. The steam engine car has been studied and tested. It gives 0.05% carbon monoxide, 20 ppm hydrocarbons, and 70 ppm nitrogen oxides. To reduce NOx the combustion temperature must be lowered or accelerating combustion is necessary.

**28611** **APTIC NO. 50978**

Arsovic, Hans M. and Harry Burchard

**REMOVAL OF GASEOUS AND LIQUID EMISSIONS FROM FLAYING STATIONS (ARSOX-METHOD).** *(Reinigung von gasfoermigen und fluessigen Emissionen aus Tierkoerperbeseitigungsanstalten (Arsox- Verfahren)). Text in German. Gesundheitstech., (4):67-70, 1973.*

In an experimental plant with a throughput of 5000 cu m waste air/hr various methods of odor removal in the off-gas from flaying stations were tested. Washing with water, alkaline fluids, and acid scrubbing fluids and the application of ozone and chlorine were tested. With water a noticable odor reduction could be achieved only with fresh water in quantities which are not economically justifiable. With alkaline and acid scrubbing fluids a 30% reduction was achieved. With ozone and chlorine, a noticeable but unsatisfactory odor reduction could be achieved. Since the waste gases from flaying stations contain a number of different substances ranging from alkaline substances such as ammonia and amines, neutral substances such as various esters with unsaturated fatty acids and alcohols, aldehydes, and lactone, to acid substances such as mercaptans, hydrogen sulfide, sulfur dioxide, and propionic acid, a two-step process was tried out. The waste gases were first treated with activated chlorine dioxide followed by a treatment with ozone. This method was applied in practice in a flaying station in Suessen with good results. Odor levels of less than 1 to 100 ppm were obtained.

**28612** **APTIC NO. 50683**

Botzenhart, K. and H. Rueden

**EVALUATION OF AIR CONDITIONING SYSTEMS IN HOSPITALS.** *(Zur Beurteilung von Klimaanlagen im Krankenhaus). Text in German. Oeffentl. Gesundheitswesen (Stuttgart), 35(4):141-150, 1973. 14 refs.*

Hygienic deficiencies of climate control units in hospitals and of the microbiological air purity in operating and treatment rooms were found in all the rooms sampled. Germ concentrations were measured with a slit sampler in operating rooms with varying types of ventilation. Air enters the sampler with high speed through small slots and impacts on a rotating agar plate. Germ-laden particles remain on the plate due to the forces of inertia. Without any preparation the germs can be counted after 2-5 days of incubation at 30 C. The slit sampler samples between 15 and 3500 l air in a maximum of 10 min. High cu m germ values were found in many cases. These germs originated mainly from people and objects in the operating room, and only to a minor extent from the climate control system. Improvements in the ventilation system will thus not always reduce germ concentrations. Other control measures are discussed for removing microorganisms, including filters, air conditioning, and exhaust systems.

**28613** **APTIC NO. 50430**

Brille, Maurice

**THE FATE OF AUTOMOBILE ENGINE. 1. POLLUTION CONTROL, YES, BUT...** *(Ou va le moteur d automobile? 1. Anti-pollution? Oui, mais...). Text in French. Ing. Tech., no. 271:37-40, Jan. 1973. 3 refs.*

General problems of automobile-generated air pollution, and possible ways of emission control are surveyed. Since complete combustion in spark ignition and diesel engines is impossible, and measures suitable for reducing one particular emission usually have an increasing effect on other emissions, a compromise between such measures is inevitable. To achieve minimum pollution and fuel consumption, and to obtain maximum possible power output at the same time, the mixing ratio should be kept between 0.85 and 0.95 for spark ignition engines and below 0.60 for diesel engines, and also the operating temperature should be kept as high as possible, especially for part load operation. Elevated temperatures lead, however, to increased nitrogen oxides. The unburned hydrocarbon and carbon monoxide emissions from automobiles are highest in city traffic where NOx emissions are practically nonexistant. Modifications of the compression ratio, of the shape of the combustion chamber, especially of the surface-to-volume ratio, and of the ignition timing may result in optimum exhaust emission in terms of the minimum amount of pollution, taking the specific harmfulness of the individual exhaust components into account. Introduction of new types of fuel, the use of multifuel engines, and especially the minimization of the specific fuel consumption are among the basic possibilities to reduce overall exhaust emissions. Thermal and catalytic techniques and devices for exhaust gas postcombustion require further improvements.

**28614** **APTIC NO. 50413**

Capponi, P.

THERMAL CENTRALIZATION AND AIR POLLUTION. *(La centralizzazione termica e l inquinamento atmosferico) Text in Italian. Riv. Combust. (Milan), 27(1):6-14, Jan. 1973.*

Comparative calculation of sulfur dioxide pollution emitted by residential heating systems equipped with highly efficient heating units using gas or liquid fuels conforming to antipollution standards and by a central heat generating plant with a remote distribution system using diathermal fluids was made on the basis of simplifying assumptions using accepted formulas for the respective calculations. In the latter case, provision must be made for the dispersion of pollutants (fly ash, SO2) by tall stacks. The stack height of a centralized heat generating plant was calculated for a case where the burning of low sulfur fuel containing 0.5% S was replaced by burning a residual oil with 3% S content. The comparison calculation revealed that SO2 concentrations for a wind velocity of 1.8 m/sec from both the central heat generating plant and from 100 single family dwellings occupying an area of 1 sq km were comparable at different distances downwind if the stack of the central heating plant is presumed to be located in the center of the housing development square. The stack height for the case where a fuel with a sixfold sulfur content was used was calculated from the observation that maximum pollution is inversely proportional to the square root of the effective discharge height. For smoke being discharged from the stack at 24 m/sec and at a temperature of 225 C, the stack would have to be 124 m high.

**28615** **APTIC NO. 50421**

Chiniara, C.

A THERMODYNAMIC METHOD FOR DETERMINATION OF THE DROPLET CONCENTRATION OF WET AIR. *(Ein thermodynamisches Verfahren zur Bestimmung des Tropfengehaltes nasser Luft). Text in German. Brennstoff-Waerme-Kraft, 25(2):31-38, Feb. 1973. 8 refs.*

A probe was developed operating according to the principle of the throttle calorimeter. It can be used for determining the droplet emission by cooling towers. The probe is vertically arranged in the path of the exiting plume. The samples are drawn into the probe with the aid of a vacuum pump. After passing a starting path, the samples get to the three-stage adjustable throttle. Here all water droplets carried along can evaporate by adiabatic throttling. The entire throttle is installed into a plexiglass tube. The cooling of the air in the throttle is measured with a thermopile. The throttle is followed by eight successive inserts and several layers of narrow-meshed bronze screens. The flow velocity is accelerated by the inserts to an extent that larger droplets are broken up into smaller ones for better evaporation. A diagram is provided for determination of the droplet concentration for the measured temperature difference between entrance and exit of the probe. The diagram is valid for an entrance to exit pressure ratio of 0.4 bar and an entrance pressure of 1 bar. Tests with the probe revealed that the specific droplet concentration can be reliably determined under cooling tower exit conditions.

**28616** **APTIC NO. 50865**

Cross, Frank, L.

AIR POLLUTION CONTROL. *Waste Age, 4(1):40, 42, 44, Jan.-Feb. 1973.*

The operational features of a wet scrubber air pollution control device installed on an apartment-house incinerator for solid waste reduction are discussed. The operation and maintenance of the incinerator scrubber are described. Single-pass type and re-circulated scrubbing systems are discussed. The concentrated wastewater that would be discharged from the re-circulated scrubbing system would be 10 times more concentrated than in the single-pass type scrubbing system, but the quantity of water discharged would be only 1 to 3% of that from a single-pass type system. Results for a 100 lbs/hr incinerator equipped with a low-energy wet scrubber are presented. Compactors, shredders, and hydropulpers provide alternative solution to the disposal or reduction of solid waste in apartment buildings.

**28617** **APTIC NO. 50937**

Davids, P. and W. Brocke

TECHNICAL POSSIBILITIES FOR REDUCTION OF THE POLLUTANT EMISSION FROM INCINERATORS. *(Technische Moeglichkeiten zur Verminderung der Schadstoffemission aus Muellverbrennungsanlagen). Text in German. Muell Abfall, 5(3):72-75, 1973. 10 refs. (Presented at the Muelltechnische Kolloquium, Stuttgart, West Germany, March 8, 1973.)*

Incinerators emit hydrogen chloride, hydrogen fluoride, sulfur dioxide, and oxides of nitrogen. Since hydrogen chloride is water soluble its separation is relatively easy compared to SO2. Through scrubbing with water, cleaned gas concentrations of less then 10 mg HCl/cu m can be reached. Hydrogen fluoride, too, is water soluble. In aluminum plants, scrubbers for HF for several million cu m/hr are in operation. The cleaned gas concentrations are around 1 mg HF/cu m. For sulfur dioxide, alkaline absorbents must be used. For desulfurization, a number of processes exist, some are in operation behind steam generators. In incinerators of the Federal Republic of Germany, scrubbers for waste gas cleaning are hardly used. Extensive measurements were carried out with a scrubber in an incinerator with a throughput of 2.5 tons/hr and an off-gas quantity of 18,000 cu m/hr. The off-gas was first cooled to 70 C. In several parallel venturi nozzles the dust was separated and the water soluble gaseous components absorbed. After passage of a droplet separator, the off-gas was heated again and blown out through the stack. An average collection efficiency for HCl of 95% and for HF of 96% was obtained. The average concentrations in the cleaned gas were 27 mg HCl/cu m and 0.3 mg HF/cu m. The collection efficiency for SO2 was 7% and for NOx was 12%. Thermogravimetric and laboratory experiments concerning the sorption properties of comminuted slag from incinerators for HCl and SO2 under simulated conditions revealed that at between 500 and 700 C the slag has a large binding potential for these substances.

**28618** **APTIC NO. 50456**

Eguchi, Tanesue and Yokyo Jo

METHOD FOR REMOVING LEAD FROM AUTOMOBILE EXHAUST GAS. *(Jidosha haikigasu chu no namari jokyoho). Text in Japanese. (Japan Automobile Research Inst., Tokyo) Japan. Pat. Sho 48-744. 2p., Jan. 11, 1973. (Appl. Dec. 22, 1970, 1 claim)*

Copper and/or nickel and a halogen and a coaly substance can be heated in a non-oxidation atmosphere to produce a catalyst suitable for removing lead from automobile exhaust gases. In one case, 100 parts of copper oxide were mixed with 10 parts of cupric chloride and 20 parts of 20-28 mesh petroleum coke. The mixture was heated at 700 C for 45 min and packed into the muffler of an automobile. The catalyst decreased lead from 2.5 micrograms/l to 0.2 micrograms/l. In another case, a Cu-Ni alloy was manufactured from 100 parts CuO, 10 parts nickel chloride, and 10 parts graphite; the alloy reduced lead in automobile exhaust gas from 2.5 micrograms/l to 0.75 micrograms/l.

***28619*** ***APTIC NO. 50525***

*Eguchi, Yoshitomo*

*A METHOD OF REMOVING GAS. (Kitai no datsuri-ho). Text in Japanese. (Takeda Chemical Industries, Ltd., Osaka (Japan)) Japan. Pat. Sho 48-6027. 4p., Feb. 22, 1973. 1 ref. (Appl. Aug. 27, 1968, 1 claim).*

A method is described of removing sulfur oxides from activated carbon which adsorbed SOx from stack gases. Activated carbon has several disadvantages as an adsorbent including low adsorption ability and the need to be regenerated. Usual regeneration methods consume a large quantity of carbon and reduce adsorption power. The new method regenerates the carbon without changing its power to remove SOx. It is regenerated with carbon monoxide and/or hydrogen 250-350 C at a pressure of 3-10 kg/sq cm G.

**28620** **APTIC NO. 50530**

Eguchi, Yoshitomo and Kunitaro Kawazoe

A CATALYZER FOR OXIDIZING GAS. *(Gasu sankayo shokubai). Text in Japanese. (Takeda Chemical Industries, Ltd., Osaka (Japan)) Japan. Pat. Sho 48-7994. 5p., March 10, 1973. 2 refs. (Appl. May 13, 1969, 1 claim).*

A catalyst used in the catalytic oxidation of sulfur oxide, nitric oxide, and hydrogen sulfide is described which consists of carbon carrying a vanadium oxide catalyst instead of a compound of kalium, lithium, or barium. The catalyst can be manufactured by holding 1 times 10 to the -6th power to 4 times 10 to the -5th power g into a porous carbon such as activated charcoal or coke. The vanadium oxide is metalized over the surface of the carbon particles by dipping the carbon into a vanadium oxide solution, by sprinkling the vanadium oxide over the carbon, or by forming a vanadium compound or vanadium ion by ion exhange on the carbon with surfaces previously adsorbed with a cation such as ammonium.

**28621** **APTIC NO. 50698**

Eguchi, Y.

REMOVAL OF GASEOUS CONTAMINANTS FROM AIR. *(Kukichu no gasujo osen busshitsu no jokyo). Text in Japanese. Kuki Seiji (Clean Air-J. Japan Clean Air Assoc., Tokyo), vol. 10:39-61, March 1973.*

The removal of gaseous contaminants from indoor air is discussed. Odors can be removed by activated coal filters. Air conditioning systems can be combined with water scrubbing systems for absorption. Costs, sources, toxicity, and other factors are mentioned for sulfur dioxide, hydrogen sulfide, hydrocarbons, carbon monoxide, nitrates, nitrogen dioxide, nitric oxide, and particulates.

**28622** **APTIC NO. 50703**

Fujii, S.

AIR CLEANING PROGRAM, ITS MAINTENANCE AND CONTROL. *(Kuki joka keikaku to iji kanri). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), vol. 10:10-27, March 1973.*

Air cleaning equipment performance is discussed including volume of air cleaned, pressure loss, pollution removal ratio, loading capacity, and maintenance. Dust cleaners, air filters, legislation, emissions standards, the Building Control Law, and other factors are described.

**28623** **APTIC NO. 50417**

Grossmann, Dietrich and Guenter Haertel

EXHAUST GAS CLEANING OF OTTO ENGINES BY CATALYTIC AFTERBURNING WITH CONTROLLED EXHAUST GAS COMPOSITION. *(Abgasreinigung bei Ottomotoren durch katalytische Nachverbrennung mit geregelter Abgaszusammensetzung). Text in German. Automobiltech. Z. (Stuttgart), 75(4):140-143, 1973. 4 refs.*

For the afterburning of Otto engine exhausts, catalysts are available which permit the simultaneous reduction of the oxides of nitrogen and the oxidation of carbon monoxide and hydrocarbons within an extremely narrow range of the fuel-to-air ratio. A device is described which can maintain the narrow fuel-to-air ratio by controlled addition of secondary air to the exhaust gas and by operation of the Otto engine with a lack of air. The combustion in the engine takes place at a fuel-to-air ratio of lambda less than one. The exhaust gas flows through a catalyst bed where it is afterburned. Between engine and catalyst, secondary air is added so that the catalyst receives an exhaust gas with an air ratio of lambda one. The exhaust gas composition at the entrance of the catalyst is measured by a probe which reacts to the oxygen concentration in the exhaust gas. The electric signal from the probe is evaluated in an electronic control unit and converted into electric signals to which an electromagnetic control valve responds. This valve controls a secondary air regulating valve. This kind of regulation does not interfere with the processes experiments with the device have been very encouraging. But the question of the useful lifetime of the catalyst has not been solved.

**28624** **APTIC NO. 50461**

Haga, Tatsuro

DISPOSAL METHOD AND DEVICE FOR CRUDE AND HEAVY OIL COMBUSTION SOOT. *(Genjuyu nensho susu no shorihoho oyobi shorisochi). Text in Japanese. (Toden Fly Ash Industrial Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 48-993. 5p., Jan. 12, 1973. (Appl. Oct 2, 1969, 2 claims).*

A device is discussed for separating the nickel, vanadium, and sulfur content from soot from crude and/or heavy oil combustion in a power plant. Ammonia is added to the soot to convert sulfur to a nitric compound composed mainly of ammonium sulfate. Water is added to form a solution from which pure carbon is filtered. The nitric compound is separated by crystallization. The remaining liquid is neutralized, and a metallic salt sediment containing Ni and V is left. A practical case is described.

**28625** **APTIC NO. 50402**

Harada, Tokuji

THE PRESENT SITUATION AND TRENDS OF ANTI-NOX TECHNOLOGY FOR BOILERS. *(Kotei nensho sochi ni okeru NOx taisaku gijutsujo no genjo to hoko). Text in Japanese. Sangyo to Kankyo (Ind. Environ.), 2(3):32-37, Feb. 1973.*

Experiments were conducted to improve combustion to lower nitrogen oxide emissions including low oxygen operation, two-step combustion, exhaust gas recirculation, and burner improvement. Excess air was varied in a boiler fired by heavy oil. Exhaust gas recirculation reduced NOx by 25%. The use of a reduction gas and an alkali solution was studied to reduce NOx in stationary boiler stack gas. A catalyst which rapidly oxidizes nitric oxide at low temperatures is needed. A contact reduction method is being studied in a pilot plant. The effect of oxygen, combustion temperature, nitrogen in fuel, boiler load, and other operating factors on NOx emissions are being studied.

**28626** **APTIC NO. 51003**

Haus, R.

THE NON-POLLUTING OIL HEATER. *(Der umweltfreundliche Oelofen). Text in German. Oel Gasfeuerung, 18(5):394-398, 1973.*

Oil combustion in an evaporation burner is described. With this burner the conventional cylindrical container has several rows of perforations for air access. In a pan at the bottom the oil evaporates. The arrangement of the perforations and the size of each hole is very important for the mixture formation. A certain division into chambers by rings inside the cylinder also favors the mixture formation. The hot rings provide additional heat for the mixture of oil vapor and air. The dimensions of the cylinder are important for good combustion. The lowest row of perforations is as high above the bottom as is required to avoid any oil leaking out. The central rows have more holes than the bottom rows. Through the top rows about 65 to 70% of the entire air flows in. With this kind of combustion a certain lack of air exists in the lower flame section. The mixture has always as much air as is required for keeping the combustion going. The flame receives the air required for complete combustion from the next higher perforations. This guarantees a long residence time, best mixing of every molecule in the vapor phase with sufficient air, and thus a good combustion. The excess air not needed for combustion dilutes the waste gases, decreases the dew point, and thus prevents damage of the stack. Since the molecules in the flame never have a large air surplus, the oxidation of sulfur and nitrogen to higher valent compounds is avoided. No unburned oil droplets get into the waste gas. The soot emission is also much lower than with atomizers, 0.65 mg/cu m versus 2 mg/cu m.

**28627** **APTIC NO. 50527**

Hirai, Masuhiko

AN AIR-LIQUID CONTACT TOWER PROVIDED WITH PACKING TO PREVENT STICKING. *(Fuchakubutsu boshiyo jutentai o sonaeta kieki sesshokuto). Text in Japanese. (Mitsubishi Heavy Industries, Ltd., Tokyo (Japan)) Japan. Pat. Sho 48-2111. 4p., Jan. 22, 1973. (Appl. Aug. 13, 1970, 1 claim).*

Improved contact towers are described for separation, absorption, and reaction towers whose packing has a scale deposited on it. To eliminate the defects of previous contact towers containing scales which cause increased flow resistance, a lattice consisting of a hollow material of a small elastic modulus can be used as packing. The packing and the lattice are subjected to elastic deformation by application of pressure to the inside of the packing or by making a vacuum to peel off the solid scale adhering to the lattice. The backing consists of various hollow materials such as zinc, aluminum, manganese, cadmium, lead, copper, or silver and their alloys which have a great coefficient of expansion and contraction with change in inner pressure, and plastics such as high-density polyethylene, medium-density polyethylene, nylon, and rubber.

**28628** **APTIC NO. 50426**

Hirose, Hideo

AIR POLLUTION CONTROL POLICY OF THERMAL POWER GENERATION STATION. *(Karyoku hatsudensho no taiki osen boshi taisaku). Text in Japanese. Kogai Boshi Sangyo (Environ. Pollution Control), 3(4):26-33, April 1973. 2 refs.*

Problems in the combustion of low-sulfur fuel oil, the use of natural gas, and stack gas desulfurization in thermal power stations are discussed. Nitrogen oxides can be reduced by reducing nitrogen in the fuel during fuel oil desulfurization. Dust can be collected in various types of mechanical and electrostatic collectors.

**28629** **APTIC NO. 50868**

Hishida, Kazuo

CONTROL TECHNIQUES OF SPECIFIC TOXICANTS RELATED TO AIR POLLUTION. *(Taiki osen kankei yugai busshitsu shori gijutsu). Text in Japanese. PPM (Japan), 4(4):58-79, April 1973.*

Control techniques for cadmium, cadmium compounds, chlorine, hydrogen chloride, fluorine, hydrogen fluoride, silicon textrafluoride, lead, and lead compounds are outlined. Sources and characteristics of these compounds are mentioned. Particulates containing cadmium, lead, and their compounds can be easily removed by dust collectors. Efficiency, application, and selection of dust collectors are discussed. Gaseous toxicants are usually removed by liquid scrubbing or gas-solid adsorption. Characteristics of packed columns, spray towers, cyclone scrubbers, venturi scrubbers, jet scrubbers, and other scrubbers are summarized. Maintenance of control equipment and safety practices are described.

**28630** **APTIC NO. 50894**

Iida, Hirofumi

COMBUSTION OF GAS AND AIR POLLUTION CONTROLS. *(Gasu nensho to taiki osen taisaku). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Tokyo, p. 61-75, 1973. 14 refs. (Presented at the Japan Society of Mechanical Engineers, Symposium on Energy Supply, 378th, Tokyo, Japan, April 19-20, 1973, Paper 6.)*

The formation of nitrogen oxides in boilers depends on the type of fuel, shape of the combustion room, type of combustion, excess air, amount of nitrogen in the fuel, rate of reaction, flame and air temperatures, and combustion room temperature. The NOx concentration decreases in the order of coal, heavy oil, and light oil, regardless of combustion equipment size. Thus, conversion to better quality fuels is a promising NOx control method. Low excess air, exhaust gas recirculation, water injection, and multi-stage combustion can be used to reduce NOx emissions.

**28631** **APTIC NO. 50755**

Inaba, E.

HD PROCESS FOR DESULFURIZATION OF STACK SMOKE. *(HD shiki haien datsuryu purosesu). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 40(5):487-492, May 1973.*

The Hitachi HD sulfur dioxide removal process has been studied in a pilot plant with 500 N cu m/hr capacity since June 1972. This process uses a saline solution of sodium chloride which passes through an electrolysis tub to absorb and neutralize SO2 in an absorption tower. Gypsum and hydrogen are obtained as by-products. Part of the sodium hypochlorite which is produced is recirculated to become NaCl after turning SO2 into sulfur trioxide. The absorption efficiency is very high and there is no scaling trouble. The operation costs are low. There is no effluent problem. Most of the processes can be automated. A 600 sq m site would be required to construct a plant with 100,000 N cu m/hr capacity (equivalent to a 120 ton/hr boiler).

**28632** **APTIC NO. 50705**

Inoue, U.

BIO CLEAN ROOM IN HOSPITAL. *(Byoin ni okeru baiokurin rumu). Text in Japanese. Kuki Seijo (Clean Air J. Japan Clean Air Assoc., Tokyo), vol. 10:74-90, March 1973, 19 refs.*

Air cleaning methods used in a hospital clean room are compared. A hard wall system and its costs are described. Protective isolation is explained. Filter module systems, cross flow, down flow system, prefabricated system, hard wall system, and clean room flow are explained. Ventilation is also discussed.

**28633** **APTIC NO. 50720**

Isahaya, Fumio

A NEW FLUE GAS DESULPHURIZING PROCESS BY SPRAY DRYING METHOD USING NAOH-AEROSOLS AS ABSORBING CHEMICAL. *(Staub, Reinhaltung Luft, 33(4):189-192, April 1973. 2 refs.*

A new flue gas desulfurizationmethod is described using sodium hydroxide or sodium carbonate as absorbing chemicals sprayed into the flue gas within a spray drying tower. The sulfur dioxide and carbon dioxide gases in the flue gas are quickly absorbed by these liquid droplets forming sodium sulfate and $Na_2CO_3$. Simultaneously, the water contained in droplets is vaporized by the sensible heat of flue gas. After $Na_2SO_3$ and $Na_2CO_3$ consistency in the droplets has reached the saturation point, their crystallization and drying occur. Thus, through these steps dry dust particles consisting of $Na_2SO_3$ and $Na_2CO_3$ are produced. Subsequently, these dust particles as by-products are sufficiently separated from the flue gas by an adequate dust collector such as an electrostatic precipitator. It is a remarkable advantage of this new process that both the desulfurization of flue gas and the production of $Na_2SO_3$ and $Na_2CO_3$ powders are simultaneously accomplished within a single spray drying tower without any gas pre-cooling. About 80-90% desulfurization canbe achieved. The pressure drop is low.

**28634** **APTIC NO. 50556**

Ise, Yotaro

A DESULFURIZING AGENT AND ITS MANUFACTURING METHOD. *(Datsuryuzai oyobi sono seizoho). Text in Japanese. (Nissan Chemical Industries Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 48-7196. 4p., March 3, 1973. (Appl. Dec. 22, 1970, 2 claims).*

An improved zinc oxide desulfurization agent is described used to remove sulfur from gases or liquids containing hydrogen sulfide or organic sulfur compounds. The desulfurization agent consists of 85-90 wt% zinc oxide, 0-0.2 moles of alkaline metal, and 5-15 wt% of the tobermorite or xonotlite silicates as a binder. The method of manufacturing the agent is described.

**28635** **APTIC NO. 50700**

Ishiguro, T.

ODOR POLLUTION AND ITS COUNTERMEASURES. *(Akushu Kogai to sono taisaku). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), vol. 10:28-38, March 1973.*

Odor measurement by humans is subjective, and thus inaccurate. It is almost impossible to evaluate odor with measurement apparatuses, such as gas chromatographs, except for special cases. Since the dispersion of odor is too complicated to apply any theoretical dispersion formula, field tests must be carried out. Many Japanese Prefectures have adopted odor prevention regulations. Odor control methods include combustion, catalytic oxidation, adsorption, and absorption. Control methods are listed for specific industries. Odors in smoke-filled conference rooms, stores, hospitals, railways, and air-conditioned buildings should be considered as well as industrial odors.

**28636** **APTIC NO. 50520**

Ishizuka, Yozo, Haruo Kuronuma, and Hisao Imai

THE EFFECT OF SURFACE TREATMENT ON THE SULFUR DIOXIDE ADSORPTION CAPACITY OF ACTIVATED CARBON. *(Hyomen shori ni yoru kaseitan no nisankaiwo kyuchakuno no henka). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 694, 1973. (Presented at the Japan Chemical Society, Spring Meeting, 28th, Tokyo, Japan, April 1-5, 1973, Paper 3D04.)*

The rate of adsorption of sulfur dioxide was measured on activated carbon which was previously treated with air, hydrogen, nitrogen, and water. The treatment of activated carbon with air at 350 C for 3 hr caused a sharp decrease in the rate of adsorption, while the treatment with $H_2O$ vapor and $N_2$ at 800 C for 3 hr, or $H_2$ at 800 C for 1 hr caused an increase. The rate of adsorption obeyed the previously reported rate equation which is expressed as a function of $SO_2$, oxygen, and $H_2O$ concentration. The amount of adsorption at the quasi-equilibrium obtained from the above rate equation is closely related to pore volume and surface area of the activated carbon. The pore volume and surface area increases with surface treatment so that adsorption also increases. Nitrogen treatment at 800 C showed recovery of the adsorption capacity of activated carbon which was previously treated with air at 350 C. The effect of surface treatment on $SO_2$ adsorption capacity is discussed with reference to $N_2$ adsorption isotherm on these treated carbons.

**28637** **APTIC NO. 50537**

Jo, S., and T. Ayuzawa

THE DEVELOPMENT OF AN EMISSION FREE CAR. *(Mukogaisha no kaihatsu). Text in Japanese. Anzen Kogaku (J. Japan Soc. Safety Eng.), 12(1):10-17, Feb. 1973.*

A constant volume sampler was adopted to consider stopping, acceleration, deceleration, and normal travelling, as well as idling. Although there are many analytical methods, there is no standard gas used in adjusting the methods. Several systems try to eliminate nitrogen oxides, carbon monoxide, and hydrocarbons at the same time. However, it is difficult to devise any sure method of achieving standard composition, since temperature and volume of exhaust gases vary and depend on running conditions. Hybrid electric systems would emit cleaner exhausts than internal combustion engines, but increase car weight and usually have defects due to batteries. New types of automobiles to meet 1975 and 1976 emission standards would consume more fuel and be more expensive than present cars. Engine operation modifications will be used to control emissions in the 1970s.

**28638** **APTIC NO. 50727**

Juda, Jan, Stanislaw Chrosciel, and Maciej Nowicki

THE INFLUENCE OF SOME FILTER PARAMETERS ON THE INCREASE OF THE PRESSURE DROP AT THE FILTERING PROCESS. *(Der Einfluss einiger Filterparameter auf die Druckverlusterhoehung beim Filtrationsvorgang). Text in German. Staub, Reinhaltung Luft, 33(4):155-158, 1973. 1 ref.*

A theoretical filtering model is described in which the increase of pressure loss by a fiber filter is a function of dust charge. The formula was tested in diameters between 15 and 55 micron, filter thicknesses of 0.5 to 3 cm, fiber densities in the filter volume between 0.01 and 0.06, particle sizes 0.5 to 10 micron, and a flow rate of 0.5 m/sec. About 200 different filter structures were used for the tests. With 10 to 15 filtering stages the pressure losses of the filter and the mass of collected dust was determined. A correction of the two constants A and epsilon of the theoretical formula brought satisfactory accuracy of the calculation of the pressure loss increase. With the corrected formula the optimum filter design with respect to increase of the pressure loss can be planned.

**28639** **APTIC NO. 50739**

Kajiwara, S.

ODOR CONTROL. *(Nensho sanka o shuto shita akushu taisaku ni tsuite). Text in Japanese. Kami-Pa Gikyoshi (J. Japan. Tech. Assoc. Pulp Paper Ind.), 27(5):213-222, May 1973. 14 refs.*

Hydrogen sulfide, methyl mercaptan, dimethyl sulfide, dimethyl disulfide, and other odors from a kraft pulp mill can be eliminated by combustion and oxidation in a rotary kiln, recovery boiler, or special incinerator. A flame arrestor is necessary to avoid back-firing. About 95% oxidation is the maximum that can be achieved; to reach 100%, a considerable change in the work structure would be required. Odors go through an alkali scrubbing tower, a mist separator, water trap, flame arrestor, and kiln. Problems of odor control by combustion include how to treat sulfur dioxide after combustion, how to collect diluted elements, and how to have economical control when the odors often contain corrosive substances which make the equipment expensive.

**28640** **APTIC NO. 50524**

Kamino, Yoshimi, Shigenori Onizuka, and Kenshi Hoda

DISPOSAL OF FIRE FLUE GAS. *(Endo gasu shori sochi). Text in Japanese. (Hitachi Shipbuilding and Engineering Co., Ltd., Osaka (Japan)) Japan. Pat. Sho 48-6028. 3p., Feb. 22, 1973. 2 refs. (Appl. Sept. 16, 1968, 1 claim).*

Equipment is described for the adsorption of sulfur dioxide into activated carbon. Then the SO2 is removed from the carbon in an atmosphere of superheated steam. This method consumes less activated carbon, recovers more SO2, and gives less chance of an explosion than other methods for removing SO2 from combustion stack gases.

**28641** **APTIC NO. 50558**

Kamino, Yasumi, Shiro Inoue, Kenshi Hoda, and Toshio Hama

METHOD AND EQUIPMENT FOR EXHAUST GAS DESULFURIZATION. *(Haien datsuryu hoho oyobi sono sochi). Text in Japanese. (Hitachi Shipbuilding and Engineering Co., Ltd., Osaka (Japan)) Japan. Pat. Sho 48-7188. 8p., March 3, 1973. (Appl. July 24, 1970, 2 claims).*

A method of desulfurizing exhaust gas by adsorption by activated carbon is described. The used activated carbon is heated to 700-900 C in an inert gas to regenerate it. Then the activated carbon is reused without lowering its adsorption efficiency.

**28642** **APTIC NO. 50397**

Katagiri, Akira, Zenichiro Takehara, and Shiro Yoshizawa

MECHANISTIC INVESTIGATION ON CATALYTIC OXIDATION OF SULFUR DIOXIDE OVER ACTIVATED CARBON SURFACES. *(Kasseitan hyomen ni okeru aryusan gasu no sesshoku sanka hanno no kiko). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 692, 1973. 2 refs. (Presented at the Japan Chemical Society, Spring Meeting, 28th, Tokyo, Japan, April 1-5, 1973, Paper 3D02.)*

Catalytic oxidation of sulfur dioxide over activated carbon is discussed in terms of electrochemistry. Activated carbon catalyzes the reaction of SO2 with oxygen and water to produce sulfuric acid. This reaction can proceed even on a surface covered with H2SO4 or H2O. The electrochemical reaction over a carbon electrode can be correlated to the catalytic activity which suggests the electrochemical mechanism in which SO2 is oxidized on the anode and O2 is reduced on the cathode covered with H2SO4 and H2O films. These electrochemical reactions are thermodynamically feasible, because the standard electrode potential is 0.17 V for SO2 oxidation and 0.23 V for O2 reduction. However, the cathode reaction should be modified as observed during SO2 oxidation over a platinum catalyst.

**28643** **APTIC NO. 50398**

Kato, Seitaro

VIEW OF TECHNIQUES FOR CONTROLLING OXIDES OF NITROGEN. *(Chisso sankabutsu no hasseigen taisaku to kongo no tenbo). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 9(3):218-232, March 1973. 63 refs.*

Nitrogen oxide removal methods are described including absorption by water, reduction, adsorption, and removal by chemical reactions. The removal process should reduce NOx to less than 100 ppm at the stack outlet. Although it is possible to suppress NOx by improving combustion, improved combustion can only give a 30% decrease due to the decreased efficiency of fuel consumption. It is more difficult to remove both NOx and sulfur oxides at the same time. Several processes for removing both pollutants are discussed. There are presently no perfect processes for removing NOx from power plant stack gases. An ideal process would be a dry process using a catalyst, but wet processes are presently being favored.

**28644** **APTIC NO. 50909**

Kimura, N.

DUST COLLECTION TECHNOLOGY BY BAG FILTER. *(Baggu firuta ni yoru shujin gijutsu). Text in Japanese. Kagaku Kogyo (Japan), 37(3):223-225, March 1973.*

The design and operation characteristics of bag filters for dust collection were examined. The topics included operating variables, design criteria for optimum efficiency, different types of bag filters, bag filter construction and material, and trends in dust collection by bag filters. Problems in operation included choice of filter materials, high temperatures, and filter bag cleaning to prevent dust accumulation. The characteristics of various filtering cloths were reviewed.

**28645** **APTIC NO. 50463**

Kitamura, Hiroyuki

COR POK GAS BURNER TYPE DEODORIZING EQUIPMENT. *(Korubakku chokuen-shiki dasshu sochi ni tsuite). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 40(3):230-238, March 1973.*

A Cor Pok gas burner used to deodorize gases is being manufactured by the Gadelius Co. of Japan. The equipment features a luminous flame which produces quick oxidation heat cracking of odors. Depending on the odorous gas, the most economical temperature is 760 C or 650 C. Using a Cor Pok type heat exchanger consisting of steel tubes, up to 70% heat recovery is possible, which saves a great deal of fuel. The burner is giving 99.94-99.98% deodorizing efficiency in a plant generating phenol and formaldehyde odors.

**28646** **APTIC NO. 50914**

Kohayakawa, Takashi

COUNTERPLAN AGAINST EXHAUST GASES FROM GASOLINE ENGINE. *(Gasorin kikan ni okeru haishutsu gasu taisaku). Text in Japanese. Nippon Kikai Gakkai-shi (Journal of the Japanese Society of Mechanical Engineers) (Tokyo), 76(653):578-585, May 1973. 86 refs.*

In the 6 years since the carbon monoxide air quality standard was established in Japan, CO has gradually decreased since 1969 when the concentration peaked. The CO problem has been almost gone since 1971 due to countermeasures taken against automobile exhaust. Lead in gasoline, and thus air, has also decreased. Concentrations of hydrocarbons and nitrogen oxides still do not meet air quality standards. Exhaust gas recirculation, air injection, afterburners, and other automobile exhaust control methods are described.

**28647** **APTIC NO. 50427**

Kurosawa, Keiji

PROBLEMS CONCERNING NOX FROM STATIONARY SOURCES. *(Kotei hasseigen karano NOx o meguru shomondai). Text in Japanese. PPM (Japan), 4(2):16-23, Feb. 1973.*

Several nitrogen oxides control methods are discussed including tangential firing boilers, low excess air combustion, and absorption. Desulfurization of fuel and stack gases are mentioned. Sulfur dioxide control is easier than NOx control. The effects of temperature, excess air, fuel nitrogen, and air/fuel ratio on nitric oxide and NOx emissions are described in graphs.

**28648** **APTIC NO. 50386**

Masuda, Nobuo

CONTROL OF NOX EMISSIONS BY COMBUSTION MODIFICATION. *(Nensho sosa yori mita chisso sankabutsu no haishutsu seigyo). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 9(3):259-265, March 1973. 11 refs.*

The control of nitrogen oxides by combustion modifications including two-step combustion, stack gas recirculation, and improved burners is discussed. Nitrogen dioxide measuring devices should be increasingly used to determine $NO_2$ emissions from smaller combustion equipment. The Daido Caloric burner using recirculation is the only realistic means of lowering $NO_x$; it also decreases carbon monoxide and dust pollution. The combustion air is blown into the combustion chamber through a ring nozzle, and the front chamber's pressure is made negative compared to the combustion chamber. By recirculating the high temperature waste gas into the frontal chamber, fuel is sent into the chamber for further combustion. No special effort or device is needed for combustion control. With the increase of excess air, $NO_x$ decreases.

**28649** **APTIC NO. 50392**

Matsumoto, Takeji

STACK GAS DISPERSION AND TALL STACK. *(Haien kakusan to koentotsu) Text in Japanese. Anzen Kogaku (J. Japan Soc. Safety Eng.), 12(1):71-77, Feb. 1973. 6 refs.*

The advantages, disadvantages, and problems associated with tall stacks in relation to stack gas dispersion are reviewed. Tall chimneys reduce most ground level concentrations of pollutants, except for larger particulates, at all distances. With smaller and lower stacks, restrictive weather conditions and special topographic conditions are of greater consideration. Tall stacks are also very effective when joined with control methods at the source. For sources using high-sulfur fuels, however, or sources affected by emissions from other industrial sources, reducing pollutant emissions at the source is more effective than tall stacks.

**28650** **APTIC NO. 50899**

McClellan, Guerry H. and Myra E. Mills

SOLIDS FROM WET LIMESTONE SCRUBBING OF POWER PLANT STACK GASES. *J. Air Pollution Control Assoc., 23(2):122-127, Feb. 1973. 3 refs.*

Optical and scanning electron microscopic examinations were made of the solids in aqueous suspensions of crushed limestone that was used to scrub sulfur oxides from a pilot plant power plant stack gas. Most of the sulfur was recovered as hydrated calcium sulfite which formed small thin plates that settled slowly; the relatively small amount of gypsum (hydrated calcium sulfate) that was formed was present as massive crystals that settled rapidly. Scaling was encountered in significant amount only on the mist eliminator which was washed periodically with the supernatant solution from which the solids had been settled. The scale was composed principally of massive gypsum crystals, but the plastic surfaces on which scale had formed were covered with a fine grained mixture of fly ash and calcium sulfite that had acted as the nucleating surface for the gypsum. The fly ash in the scrubber solids was present mostly as spheres, and these acted only as inert diluents of the solids. (Author abstract modified)

**28651** **APTIC NO. 50459**

Miyaji, Kamezo

NEW CORROSION RESISTANT EQUIPMENT MATERIAL: COMPOSITE MATERIAL OF POLYVINYL CHLORIDE AND FIBER GLASS REINFORCED PLASTIC (FR PLATE). *(Shin taishokusochi zairyo - Enbi to FRP no fukugotain (FR pureito)) Text in Japanese. Preprint, Japan Welding Assoc., Tokyo, 9p., 1973. 18 refs. (Presented at the Seminar on Plastics Used in Public Nuisance Prevention Devices and Their Processing Techniques, Osaka, Japan, Feb. 19-20, 1973.)*

A composite material of polyvinyl chloride (PVC) and fiber glass reinforced plastic (FRP) is discussed for use as a pollution control device construction material. This material has the corrosion resistance of PVC and the mechanical strength of FRP. The composite material has greater tensile strength, greater bonding strength, higher impact resistance, tighter inter-layer bonding, smaller linear expansion, and better corrosion resistance than other materials. The method of manufacturing this material using a FR plate is described.

**28652** **APTIC NO. 50435**

Miyazaki, Yoshitaka

PUBLIC NUISANCE PREVENTION EQUIPMENT AND RELATED WELDING TECHNOLOGY. *(Kogaiboshikiki to yosetsu kanren gijutsu) Text in Japanese. Preprint, Japan Welding Assoc., Tokyo, 14p., 1973. 8 refs. (Presented at the Seminar on Plastics Used in Public Nuisance Prevention Devices and Their Processing Techniques, Osaka, Japan, Feb. 19-20, 1973.)*

The construction of pollution control equipment and factors such as corrosion resistance, and mechanical strength are discussed. Corrosion resistance of plastics are generally superior to other construction materials such as stainless steel. Polyvinyl chloride (PVC), fiber glass reinforced plastic (FRP) and PVC/FRP, are used as anti-corrosion materials. Industrial sources of sulfur dioxide, hydrogen fluoride, chlorine, hydrogen chloride, and other harmful gases are listed with their disposal devices and processes. Plastic welding technology is discussed, and a non-plasticizing welding rod is recommended over an ordinary welding rod.

**28653** **APTIC NO. 50557**

Mizuno, Minoru, Masao Yokoi, and Yo Saito

A GAS CLEANING METHOD USING THE DEAMMONIA PROCESS FOR COKE OVEN GAS IN REMOVING SULFUR DIOXIDE IN EXHAUST GAS. *(Haigasu-chu no aryusan gasu jokyo ni kokusuiro gasu no datsu ammonia kotei o riyo suru gasu seijoho) Text in Japanese. (Nippon Kokan K. K., Tokyo (Japan)) Japan. Pat. Sho 48-6386, 3p., Feb. 24, 1973. (Appl. May 13, 1967, 1 claim).*

A method for cleaning exhaust gases from thermal power plant boilers or sintering factories is described which combines desulfurization and the deammonia process for coke oven gas. The method produces ammonium sulfite as a by-product. The coke oven gas is cleaned by an aqueous acid solution which absorbs sulfur dioxide. Then the solution is turned into an alkaline solution by absorption of the ammonia in the exhaust gas. The exhaust gas is washed with the aqueous solution to absorb $SO_2$, and then the solution is turned back again into the acid aqueous solution for reuse.

**28654** **APTIC NO. 50565**

Muermann, Herbert

COMPONENTS FOR VENTILATION AND AIR CONDITIONING SYSTEMS. *(Bauelemente fuer Lueftungs- und Klimaanlagen) Text in German. Wasser Luft Betrieb, 17(4):118-121, 1973.*

Ventilation and air conditioning systems are divided into three groups: exhaust air systems, ventilation systems, and air conditioning systems. Air filters for dust collection are an important component of such systems. Recently dry air filters have come into use. The effect of these filters is similar to the oil wetted metal filters. The dust laden air flowing through the dry fiber mats is forced to deflect frequently because of the different shapes and structures of the fibers. Coarse dust particles are retained in the first layer of the mats because of their larger kinetic energy. The following denser and finer layers of the filter mat retain the fine dust particles. The filter mats can be cleaned and reused several times. These filter mats either form cells or come on rolls. In recent years framed filter mats of large surface have come into use. They can be used for two years without servicing. In addition to this they have the advantage that the mats are rigidly fixed into the frame and the dust cannot fall off as with the rolls. Air ducts, valves, and ventilation screens are described and illustrated.

**28655** **APTIC NO. 50840**

Murthy, Belur N. and Joshua S. Bowen, Jr.

RESEARCH AND DEVELOPMENT FOR IMPROVING ODOR CONTROL TECHNOLOGY. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., National Environmental Research Center, 10p., 1973. 17 refs.*

Research and development for improving odor control technology are reviewed. Surveys indicate that the most important odor sources are rendering plants, chemical/plastics plants, sanitary processes, petroleum and related industries, and animal feedlots. Research and development projects were selected from a review of the status of present odor control technology. Major techniques which are applicable to odor control are reviewed including: process change, ventilation diffusion, catalytic and thermal combustion, wet scrubbing, adsorption, and counteraction. Laboratory studies on selection of reagents for wet scrubbing indicated that, while oxidizing agents are effective for absorbing most odors, sodium hydroxide, inorganic acids, and bisulfites are most effective for absorbing mercaptans, amines, and aldehydes. Preliminary cost comparisons of available control methods for rendering plants indicated that wet scrubbers would be the most economical, provided suitable reagents and operating conditions are determined. Studies on adsorption of odorants with active carbon indicated that lower mercaptans are oxidized on the solid surface. Active manganese dioxide on sawdust is superior to active carbon for adsorption of hydrogen sulfide over a wide range of temperatures, contact times, particle sizes, and humidities. Efforts to investigate and develop new concepts and combined systems for odor control are now in progress. (Author summary modified)

**28656** **APTIC NO. 50754**

Nagai, S.

DEVELOPMENT OF SHOWA DENKO DESULFURIZATION OF STACK SMOKE TECHNOLOGY. *(Showa Denko-shiki haien datsuryu gijutsu no kaihatsu ni tsuite). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 40(5):449-457, May 1973.*

The Showa Denko stack gas desulfurization process is used at a sulfuric acid plant. Sulfur dioxide and sulfur trioxide are recovered in an absorption tower using an ammonia solution. Ammonium sulfate is obtained as a by-product. The desulfurization rate is 95-98%. The tower also removes 70% of the dust; with a demister, the tower removes 80% of the dust. The process is a closed system, and thus causes no effluent. Stack smoke can be immediately introduced into the absorption tower. The absorption tower is compact; there is little pressure loss; and the absorption process can be separated from the post-treatment process. Very little sodium hydroxide is required, since it can be recycled when used as an absorbent. Gypsum can be obtained as a by-product when calcium hydroxide or sulfite is used as the absorbent. Costs are cited.

**28657** **APTIC NO. 50924**

Nakada, Yoshinori, Shinichi Yokoyama, Shigeru Ueda, Tadao Ishii, and Gen Takeya

HYDROGENATION DESULFURIZATION OF HEAVY OILS BY RED PEAT CATALYST. *(Akadoro shokubai niyoru juyu no suisoka datsuryu). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 2018, 1973. 1 ref. (Presented at the Japan Chemical Society, Spring Meeting, 28th, Tokyo, Japan, April 1-5, 1973, Paper 3M35.)*

The catalytic activity of a red peat catalyst was studied for the hydrogenation desulfurization of heavy oil. The effect of vanadium on catalytic activity was also examined. Fifty grams of heavy oil and 5 g of catalyst were packed in an electromagnetically stirring autoclave with hydrogen pressure of 100 kg/sq m. The temperature was raised by 3 C/min and maintained at the reaction temperature for 60 min. Measurements of sulfur, vanadium, and nickel in oil were made by coulometry, colorimetry, and atomic absorption spectrophotometry, respectively. The catalyst was sulfidized by hydrogen and hydrogen sulfide prior to desulfurization. The adsorption of H2 began at 380 C. As the temperature increased, H2 consumption increased and the fraction of light oils increased. At 400 C, H2 consumption and the light oil fraction were low when the unsulfidized catalyst was used. The effect of presulfidization of the catalyst was clear for neither desulfurization nor metal extraction. The desulfurization and metal extraction increased with increasing reaction temperature; 54% desulfurization, 89% V, and 86% Ni extraction were observed at 440 C.

**28658** **APTIC NO. 50533**

Nakai, Yoshiyuki and Tetsuya Yokogawa

A NON-ODOR PRODUCING DRYING METHOD AND ITS EQUIPMENT. *(Musyu kanso no hoho oyobi sochi). Text in Japanese. (Kanagawa Prefecture (Japan)) Japan. Pat. Sho 48-7594. 6p., March 7, 1973. 2 refs. (Appl. April 6, 1968, 2 claims).*

A method of drying and burning organic wastes in a completely odorless way is described. First the wastes are indirectly dried without contacting the exhaust gas to be burned; thus, the odors and water vapor produced are removed from the system without being mixed with the exhaust gas to be burned. Then the odors and water vapor mixture is sent to a cooling tower for separating the bad odor and water; only the odor is led into the combustion chamber. The odor is burned and resolved by combustion of fuels such as heavy oil. The waste substances can be dried continuously in a short time and in an almost completely odorless condition. The equipment consists of a drying drum provided with a baffle plate at an angle and a certain height on the inner wall, a heat exchanger to heat and dry fresh air from the outside with waste heat from the drying drum, and to supply heated air to the drying drum, a cooling tower to cool fresh air containing the odor and water vapor from the drying drum to remove the water in the air, and a combustion room.

**28659** **APTIC NO. 50396**

Nakao, Shozo, Mitsuo Moro, Ichiro Matsuda, Taisuke Mikami, and Horonobu Shinoda

A STUDY ON NOX REMOVAL (I) -- HIGH TEMPERATURE DECOMPOSITION AND CATALYTIC DECOMPOSITION IN A REDUCED ATMOSPHERE. *(NOx jokyo ni kansuru kenkyu (I) -- Kangen funikika deno koon bukai oyobi shokubai bunkai). Text in Japanese. Preprint, the Japan Chemical Society, Tokyo, p. 683, 1973. (Presented at the Japan Chemical Society, Spring Meeting, 28th, Tokyo, Japan, April 1-5, 1973, Paper 41.)*

High temperature decomposition and catalytic decomposition of nitrogen oxides was studied in a liquefied petroleum gas-air mixture containing a large amount of nitrogen oxides (25% nitric oxide and 20% nitrogen dioxide). The decomposition was carried out at 800 and 1500 C. Decomposition occurred at an oxygen content of the inlet gas less than 30% of the theoretical amount required for combustion of LPG. When the oxygen exceeded 30%, no decomposition occurred. Removal of NOx by high temperature decomposition was insufficient, and deposition of carbon occurred. Platinum and palladium catalysts were superior to nickel, copper-chromium, and iron catalysts in terms of catalyst life and activity. At temperatures above 350 C, NOx reduction takes place over the two catalysts. The ratio of oxygen to LPG influenced the reduction.

**28660** **APTIC NO. 50531**

Nakaoka, Toshio

DESULFURIZER. *(Datsuryuzai). Text in Japanese. (Nisshin Chemical Industries Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 48-2117. 3p., Jan. 22, 1973. (Appl. Dec. 29, 1970, 1 claim).*

An improved iron oxide desulfurizer is described containing iron oxyhydroxide. The iron oxide can remove sulfur from hydrogen sulfide or organic sulfur compound-bearing gas. The desulfurizer is composed of iron oxyhydroxide, an alkaline metal compound of 0.0001 to 0.2 mole in relation to 1.0 mole of iron of the iron oxyhydroxide, and a binding agent of 5-15 wt% iron oxyhydroxide.

**28661** **APTIC NO. 50879**

Negishi, Naoki and Asaya Sakai

PETROLEUM DESULFURIZATION. *(Sekiyu no datsuiwo ho). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 48-11321. 8p., April 12, 1973. 3 refs. (Appl. Feb. 16, 1967, 3 claims).*

A method of desulfurizing heavy oil is described using a compound of iron oxide. A pyrite cinder promotes the desulfurization, which takes 1 hr at 380 C and 8 hr at 350 C to achieve 50% desulfurization. The desulfurization efficiency rises with some coking taking place after reaching the 50% desulfurization level, to bring the eventual desulfurization rate to 70%. The residuals obtained by filtration of thereaction-produced material contain the iron oxide compound whose oxygen has been partly displaced by sulfur. The other sulfur is physically adsorbed by the iron oxide compound and by the carbon substance produced by coking. While the pyrite cinder is the reaction agent, the active iron oxide compound containing sulfur thus also acts as a catalyst for further desulfurization. Thus the desulfurization rate is increased. In the new method, oil containing sulfur is heated in the presence of the iron oxide compound under low pressure so that the sulfur can be adsorbed by the iron oxide compound. After separating the desulfurized oil, the residual including the iron oxide compound are regenerated by heating or other processes.

**28662** **APTIC NO. 50907**

Nirei, T.

DESIGN AND CONTROL OF CLEAN ROOM. *(Kuriin rum no sekkei to kanri). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), vol. 10:62-73, March 1973. 7 refs.*

Standards for clean room design and control are reviewed. Laminar and conventional flow types are examined with respect to advantages, defects, and costs. The major criteria included fresh outside air, mechanical air supply and displacement, natural air supply and displacement, and the exhaust recirculation ratio, concentrations of aerosols in outside and indoor air, the dust passage ratio of the main filter and the prefilter, and the concentration of indoor dust.

**28663** **APTIC NO. 50535**

Nobue, M. and T. Ishizuka

ON TEC/IFP SULFUR OXIDE REMOVAL FROM STACK GAS PROCESS. *(TEC/IFP haien datsuryu purosesu ni tsuite). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 40(2):116-122, Feb. 1973. 5 refs.*

The Toyo Engineering Co./Institut Francais du Petrol method of removing sulfur oxides from stack gas consists of the TEC processes which cools the waste gas and absorbs SOx with ammonium sulfate and of the IFP process which recovers sulfur from the ammonium sulfate solution by steam stripping to make steam mixed with sulfur dioxide, ammonia, and water which are reacted with hydrogen sulfide. Then sulfur can be recovered by the Claus reaction. This method can be used on stack gases from heavy oil boilers, oil refineries, and sintering furnaces.

**28664** **APTIC NO. 50485**

Noguchi, Keiichi

DESULFURIZATION OF STACK GASES. *(Haien datsuryu sisutemu). Text in Japanese. Kogai Boshi Sangyo (Environ. Pollution Control), 3(3):43-47, March 1973.*

Direct desulfurization of heavy oil can eliminate 70-80% of the sulfur and lower the sulfur content to 1.2%. Indirect desulfurization can eliminate 50% of the sulfur and lower the sulfur content to 1.5%. Heavy oil desulfurization capacity was 630,000 barrels/day in 1972 and will be 1,280,000 barrels/day by 1974. Since diffusion by high stacks is of limited value, stack gas desulfurization and oil desulfurization will be needed. Site conditions, meteorological conditions, by-product recovery, comparison with low-sulfur fuel price, costs, secondary pollution, and other factors must be considered in choosing the appropriate control methods. The economic recovery of sulfuric acid or gypsum during stack gas desulfurization will depend on the demand for these products. A chemical fertilizer should be developed from nitric acid to replace ammonia sulfate which is excessively available. Wet and dry desulfurization methods are compared.

**28665** **APTIC NO. 50420**

Nomura, Shigeo and S. Takahashi

REMOVING NITROGEN OXIDES OCCURRING DURING THE METAL FINISHING PROCESS. *(Kinzoku hyomen shori kojo ni okeru chisso sankabutsu no jogairei). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 9(3):267-273, March 1973. 1 ref.*

Nitrogen oxides are emitted during metal finishing using nitric acid. Removal methods include reduction, adsorption, and absorption. Activated coal is usually used as the adsorbent, however, it is affected by the presence of water. Since heat is generated in the adsorption reaction, there should be a temperature control device. All types of solutions can be used as absorbents. Venturi scrubbers, spray towers, packed columns, bubblers, and other types of scrubbers can be used. Six examples of NOx removal in metal finishing processes are discussed.

**28666** **APTIC NO. 50560**

Oda, Churin, Yoshio Horie, Mitsuru Idohara, and Masao Dairi

METHOD OF IMPROVING GAS OR LIQUID DISPOSAL. *(Tsueki oyobi tsuki sochi no shoriho). Text in Japanese. (Nippon Soda Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 48-7187. 3p., March 3, 1973. 1 ref. (Appl. Dec. 29, 1970, 1 claim).*

An improvement to the method for removing pollutants from liquids or gases passing through a disposer such as a packed tube, packed tower, or disposing vessel is described. The inside walls of the disposing vessels are coated with paints or resin pastes containing high polymers or other substances which adsorb pollutants from the fluids. To remove mercury from an aqueous solution, the inside walls of a packed tower are coated with a high polymer such as polyurethane which adsorbs mercury.

**28667** **APTIC NO. 50439**

Okamoto, Yasuo

RECENT DUST COLLECTORS AND THE ELECTROSTATIC PRECIPITATOR. *(Saikin no shujinsochi to sanroid kottoreru (Denki shujin sochi)). Text in Japanese. Preprint, Japan Welding Assoc., Tokyo, 18p., 1973. 5 refs. (Presented at the Seminar on Plastics Used in Public Nuisance Prevention Devices and Their Processing Techniques, Osaka, Japan, Feb. 19-20, 1973.)*

Gravitation, inertial, centrifugal, scrubber, sonic, bag filter, and electrostatic precipitator dust collectors are described including efficiency, particle size collection, advantages, and disadvantages. The electrostatic precipitators can be classified into dry, wet, and mist types, depending on the method used for removal of the dust deposited on the electrodes. The first uses rapping to remove accumulated dust, the second washes the electrodes with water, the third uses flow of the arrested mist. Construction, efficiency, and operating variables of electrostatic precipitators are discussed.

**28668** **APTIC NO. 50988**

Ono, Chotaro

DUST REMOVAL AND COLLECTION TECHNIQUES. *(Jojin.shujin gijutsu). Text in Japanese. PPM (Japan), 4(4):80-115, April 1973.*

Dust collection techniques are discussed including those based on gravitation, inertia, centrifugal force, electric force, agglomeration, and sonic waves. Since the nature of stack effluents is based on the emission source, fuel, air-fuel ratio, and combustion conditions, it is necessary to investigate the formation process and the nature of stack effluents before determining the necessary control technique. Characteristics and amounts of particulates from boilers, steel-making furnaces, cupolas, non-ferrous metal refining, municipal waste incineration, and cement kilns are described. The type of dust collector should be determined in terms of particle size, specific gravity, concentration, adhesive ability, electrical resistance, and gas temperature. Electrostatic precipitators, scrubbers, filters, and mechanical collectors are mentioned.

**28669** **APTIC NO. 51019**

Ozaki, Hiromi, Yoshihito Satomi, Toshiaki Hisamatsu, and Koichi Nakamura

THE HYDROGENATION DESULFURIZATION RATE OF HEAVY OIL. *(Jushitsuyu no suisoka datsuryu hanno sokudo). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 2017, 1973. 2 refs. (Presented at the Japan Chemical Society, Spring Meeting, 28th Tokyo, Japan, April 1-5, 1973, Paper 3M34.)*

The relationship between the reaction rate in hydrogenation desulfurization of heavy oils and the temperature with a desulfurization yield of higher than 80% was studied. Nickel, cobalt, and molybdenum oxide catalysts supported on alumina were used. The desulfurization yield varied with the space velocity of heavy oil in the range of 0.4-3.0 vol/vol/hr at 320-440 C. The reaction rate was two in a range of 320-395 C; however, a further increase in the reaction temperature caused a decrease in the reaction order to 1.8 at 400 C, 1.5 at 410 C, and 1.4 at 440 C. This variation in the reaction order can be attributed to the sudden commencement of the hydrogenation cracking of hydrocarbons. This interpretation can be supported by the fact that the temperature where the reaction order changes coincides with the temperature where a decrease in the average molecular weight of the resulted compounds and a sharp increase in the light oil fraction takes place.

**28670** **APTIC NO. 50384**

Ozasa, M. and M. Seko

WET REMOVAL OF NITROGEN OXIDES IN THE EXHAUST GAS GENERATED IN DISSOLVING PROCESS OF METALS. *(Kinzoku yokai haigasu chu no chisso sankabutsu no shisshishiki kyushu jokyo). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 9(3):275-279, March 1973.*

The removal of nitrogen oxides generated during the melting and surface finishing of metals is discussed. Nitrogen oxides were reduced to 50-200 ppm by introducing a gas to which steam had been added to a catalyst layer, thus, improving the removal efficiency, of the alkali solution. This process was applied to a tungsten wire plant where the exhaust gas is washed with water or a weak alkali solution to lower NOx to 1000-1500 ppm; then the exhaust is mixed with steam, goes through the catalyst layer, is absorbed by caustic alkali, and is released by the stack in a 100-200 ppm concentration of NOx. With the combined use of a conventional scrubber, higher concentration gas can be treated.

**28671** **APTIC NO. 50948**

Pichler, Helmut and Theodor Heike

GAS PRODUCTION AND SUPPLY. *(Fortschritte der Technik in Jahresuebersichten. (Fahgebiet: Gaserzeugung und-fortleitung). Text in German. VDI (Ver. Deut. Ingr.), Z. (Duesseldorf), 115(6):483-487, April 1973. 127 refs.*

In the U. S. the consumption of oil and gas is expected to rise less rapidly in the next decade because the natural coal resources will increasingly be used. In Europe, however, the trend of the past years will continue; the consumption of oil and gas will increase, that of coal will decrease. Natural gas will be used increasingly. With this shift to natural gas the focus point of environmental protection in this field has shifted from gas generation to gas distribution. Gas-fired systems emit oxides of nitrogen which can be reduced by design modification of burner and combustion chamber. The sulfur dioxide emission is lower with gas. With a share of about 15% of the energy consumption in the Federal Republic of Germany, gas contributes only 0.2% to the SO2 emission and barely 2% to the pollutant emissionn through power supply.

**28672** **APTIC NO. 50712**

Riemann, U.

MASS STOCK KEEPING AND ENVIRONMENT PROTECTION. *(Nutztierhaltung und Umweltschutz). Text in German. Landtechnik, 28(5):149-153, March, 1973.*

New methods have been developed to avoid bad odor emissions in stables. The wet dedunging method bases on a regular washing of the dung channels under the stable floor which is provided with gaps. Oxidation trenches under the stable floor immediately treat the animal excrements. Ventilators in the trench provide continuous stirring of the liquid material so that there is continuous blowing in of oxygen. Already existing bad odors can be removed by mixing the waste air with fresh air. Good results occurred with odor-separating tubes. The waste air is led through filters and then passes the tubes which emit light rays of 300 nm and render the air odorless. The application of biological or chemical deodorants is not recommended due to economic reasons and health problems.

**28673** **APTIC NO. 50726**

Rixmann, W.

ZENITH GASOLINE INJECTION SYSTEM FOR OTTO ENGINES. *(Zenith Benzin-Einspritzanlage fuer Ottomotoren). Text in German. Automobiltech. Z. (Stuttgart), 75(5):194-196, 1973.*

A new gasoline injection system for Otto engines is described. The system comprises a fuel pump, a pressure regulator unit, a dosing and distributing device, a mechanically operated small membrane air pump, and the injection valves. Via the dosing unit the fuel quantity corresponding to the respective operating condition is passed to the distributor where the individual lines to the injection valves leave. The fuel is pumped from the tank to the pressure regulating unit where a constant overpressure of 2-3 kg force/sq cm is maintained. With this pressure the fuel enters the distributor. During cold start the fuel quantity is temporarily increased. This is achieved by means of a magnetic valve which is controlled by a thermal switch. The injection system can be easily matched to any engine. The California and Europe tests performed with a BMW-Tii equipped with this new injection system revealed that the limit values going into effect in 1974 for carbon monoxide and hydrocarbons can be easily met.

**28674** **APTIC NO. 50571**

Rummel, Theodor

POWER SUPPLY, ELECTRIC HEAT AND ENVIRONMENTAL PROTECTION. *(Elektrizitaetsversorgung, Elektrowaerme und Umweltschutz). Text in German. Elektrizitaetswirtschaft, 72(5):112-115, 1973. 12 refs. (Presented at the VDEW-Elektrowaermetagung, Duesseldorf, West Germany, 1973.)*

Electric heat is increasingly used in homes and for industrial processes. In the latter case it is not only the technical and economical advantage but also the absence of pollutant emission through electric heat itself. However, without sufficient encapsulation and cleaning, secondary emissions develop. For example, the electric arc furnace must be connected to high quality dust collection systems. For this purpose venturi scrubbers, or dry filters or electrostatic precipitators are frequently used. The calcium carbide furnace cannot be operated without complete encapsulation and drawing off of the waste gases. In power plants cleaning systems for off-gas and waste water are needed. Presently the costs for air and water cleaning in power plants (without costs for cooling towers) amount to between 6 and 9% of the investment costs in soft coal-fired plants, in hard-coal-fired plants 5.5 and 8%, in oil-fired plants 5.5 to 8.5%, in gas-fired plants 2.5 to 4%, incinerator power plants 7 to 10%, and in nuclear power plants 4 to 6%. The individual pollutants (sulfur dioxide, carbon monoxide, particulates, oxides of nitrogen, hydrocarbons, and halogens) emitted by power plants are reviewed.

**28675** **APTIC NO. 50950**

Schaetzle, P.

### REMOVAL OF GASEOUS POLLUTANTS. PART 3.

*(Elimination gasfoermiger Luftverunreinigungen. 3 Teil). Text in German. Chem. Rundschau (Solothurn), 26(8):5-7, Feb. 1973. 3 refs.*

In the removal of gaseous pollutants in chemical and other industries, absorption plays an important, if limited, role. While 1 liter of water at 20 C and 700 torr will absorb 112.8 g sulfur dioxide, 3.8 g hydrogen sulfide, and 0.03 g/l carbon monoxide. In some cases chemical absorption is more effective than absorption in water, as in the case of alkaline washing solution and acid gases. Venturi washers bring the gas to be cleaned at a high flow velocity into contact with the finely pulverized washing liquid; another type of washing tower uses a bed of small spherical hollow balls which float freely between the stationary bed top and bottom with the washing liquid sprayed from a number of jets downward while the gas moves in a countercurrent direction. Cross current washers combine the advantages of concurrent and of countercurrent washers; Petersen s pressure separators make use of change of gas direction and resulting great acceleration of gas flow velocity. Oxidants sometimes not only oxidize a gaseous pollutant to a harmless substance, but also solve the waste water problem. Oxidation is often used to transform odors to nonoffending gases. This is especially important in rendering plants, fish meal, glue, linseed oil, and tarpaper production. Many specialized gas washing processes exist like Lurgi s sulfacid process which produces sulfuric acid from sulfur dioxide, the process for the removal of carbon dioxide and H2S from natural gas, and other processes.

**28676** **APTIC NO. 51025**

Schultz, M. A., M. E. Crotzer, and W. R. Knapick

### COLLECTION OF PARTICULATE MATTER FROM SMOKESTACKS USING GAMMA-RAY IONIZATION.

*Nuclear Technol., 17(1):38-48, Jan. 1973. 13 refs.*

Gamma rays were used to charge particulate maatter in stack gas to obtain high collection efficiencies. The experimental setup and the theory of particle precipitation are described. Particle charging and collection are reviewed. High efficiencies were obtained for all sizes of particulates, including those of sub micron size. The charge separation theory was suggested as the reason for collecting equal numbers of positively and negatively charged particles. The overall efficiency of the electrostatic precipitator is reviewed, and the advantages and disadvantages of the method are considered.

**28677** **APTIC NO. 50977**

Schwanecke, Rudolf

### TRENDS FOR WASTE GAS CLEANING IN CUPOLA FURNACES.

*(Tendenzen bei der Abgasreinigung an Kupoloefen). Text in German. Wasser Luft Betrieb, 17(5):150-156, 1973. 2 refs.*

For meeting present and future demands concerning dust cleaning in cupola furnaces, only three systems are suitable, for small furnaces the cloth filter and for larger ones scrubbers or electrostatic precipitators. For furnaces with melting capacities of up to 10 tons/hr, the cloth filters made of glass fiber or Teflon felt are used. They resist operating temperatures of about 200 to 250 C. It is important to have a sufficiently large filter surface and standby filters. The collection efficiency of such filters is very good. In a foundry with a hot blast cupola furnace, the dust concentration after the cloth filter was 18 mg dust/cu m waste gas. Disintegrators and venturi scrubbers can be used for cupolar furnaces. The operating principles of the venturi scrubber and the electrostatic precipitator are briefly reviewed. The very small cupola furnaces with melting capacities of less than 5 tons/hr will cease to exist in the future because their operation will become uneconomical with the increasingly strict requirements for dust cleaning. As far as the removal of the gaseous components is concerned, carbon monoxide will be burned in the self-heated recuperator. With remote-heated recuperators, the emission of gaseous components can be reduced by injection of secondary air and subsequent dispersion of the pollutants through a sufficiently high stack.

**28678** **APTIC NO. 50462**

Shibata, Hiroshi and Tomijiro Morita

### METHOD TO MANUFACTURE HIGH-PURITY SODIUM SULFITE FROM DILUTE SULFUR DIOXIDE.

*(Kihakuarvusangasu yorino kojundo aryusansoda seizoho). Text in Japanese. (Kureha Chemical Industry Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 48-1594. 5p., Jan. 18, 1973. 2 refs. (Appl. Dec. 18, 1969. 1 claim).*

A method is described for manufacturing high-purity sodium sulfite from thermal power plant stack gas containing carbon dioxide and sulfur dioxide. Carbon dioxide is absorbed by sodium hydroxide to produce carbonate. When sodium sulfite is used as the absorbent, SO2 is selectively absorbed. A new anti-oxidation agent is suggested consisting of 1 mol of hydroquionone to 0.1-1.5 mol of p-phenylenediamine which is added to 0.01 wt% of the Na2SO3 absorbent. This gave over 97% purity. Sodium sulfite alone gave only 94% purity.

**28679** **APTIC NO. 50471**

Shibata, Hiroshi and Tomijiro Morita

### METHOD TO PRODUCE SODIUM SULFITE AND SODIUM CARBONATE CONCURRENTLY FROM EMISSION GAS.

*(Haigasu yori aryusansoda, tansansoda o heisansuru hoho). Text in Japanese. (Kureha Chemical Industry Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 48-1593. 4p., Jan. 18, 1973. 1 ref. (Appl. Dec. 18, 1968. 1 claim).*

A method is described to produce sodium sulfite and sodium carbonate from thermal power plant stack gases containing sulfur dioxide (0.1-0.2%) and carbon dioxide (12%). In usual Na2SO3 or Na2CO3 manufacturing processes, sodium hydroxide solution is used which contains a large amount of water, so that a large amount of facilities and energy are required. The new method removes a large amount of water, without using heat supplied from outside sources, by concurrently manufacturing the Na2SO3 and Na2CO3. The SO2 is selectively absorbed by a solution of Na2SO3/ Na2CO3. The CO2 is then absorbed by NaOH. The NaOH is added to the absorbents to separate Na2SO3 and Na2CO3, respectively. The mother liquid from which Na2CO3 is separated is circulated for use as the NaOH solution required for separation of Na2SO3 in the SO2 absorption process. Water added and produced by neutralization in the manufacturing of Na2CO3 and Na2SO3 is evaporated concurrently with the SO2 absorption by water unsaturated emission gas during SO2 absorption.

***28680*** ***APTIC NO. 50393***

*Shigeta, Yoshihiro*

*IMPROVEMENT ON ODOR CONTROL FOR FISH METAL PLANTS. (Gyochokotsu shorijo akushu no kaizen hishiki). Text in Japanese. Anzen Kogaku (J. Japan Soc. Safety Eng.), 12(1):85-91, Feb. 1973. 7 refs.*

Methods for odor control in fish meal processing plants are reviewed. All fish meal processing units, e.g., cookers, evaporators, centrifuges, and conveyors, should be completely covered. The volume of exhaust odors can be reduced by processing equipment modifications, e.g., changing from the open cooker to the steam tube system. The collected exhausts should be destroyed by direct-firing incineration. The principal odor compounds, trimethyl amine, methyl mercaptan, and hydrogen sulfide, are then converted to low concentrations of nitrogen oxides and sulfur dioxides.

**28681** **APTIC NO. 50877**

Shirasawa, Tadao

COMBUSTION AND STACK EFFLUENT CONTROL TECHNIQUES. *(Nensho baien boshi gijutsu). Text in Japanese. PPM (Japan)), 4(4):30-41, April 1973.*

Combustion techniques and stack effluent control are described. The energy situation in Japan and the significance of efficient use of fuels are explained. The Japanese standard for heavy oil is outlined. The amount of air introduced for combustion should be related with efficient heat transfer and efficient stack effluent control. The efficiency of combustion is discussed in terms of the amount of air required for combustion, stack emissions, and air ratio. The heat balance in the combustion of carbon, hydrogen, and sulfur is summarized. The calculation of the theoretical amount of air required for combustion, the amount and composition of generated gas, and the air ratio is described. Flue gas desulfurization techniques are described including adsorption by activated carbon, the activated manganese method, and absorption by lime, ammonia, sodium hydroxide, sodium sulfite, potassium sulfite, and potassium bisulfite.

**28682** **APTIC NO. 50479**

Shirosawa, Tadao

DUST POLLUTION PREVENTION MEASURES TAKEN BY WORKSHOPS. *(Genba ni miru baijin kogai no boshi taisaku). Text in Japanese. PPM (Japan), 4(3):26-33, March 1973.*

Various operating variables affect the choice of dust collectors. The Japanese Industrial Standards on dust collecting equipment were established in Oct. 1967. The Standards on measuring the efficiency of dust collectors take into consideration composition, temperature, static pressure, gas flow, pressure flow, dust flow, dust specific gravity, electrical resistance, effluent, and other characteristics. A new two-stage electric dust collector coagulates dust by static to form larger particles which are then trapped by a cyclone. This equipment produces coagulation with a very short charging period and is especially effective on particles such as carbon black. A sound wave dust collector has not been manufactured due to noise and costs.

**28683** **APTIC NO. 50561**

Suzuki, Teruo

HOW TO DESTROY THE EMISSION FUME FROM HYDROCARBONS AND ORGANIC SOLVENTS. *(Tanka suiso narabini yuki yozai no hasseigen taisaku). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 9(3):297-303, March 1973.*

A fume incinerator developed by HIRT Combustion Engineers is described with 400-40,000 N cu m/hr capacity. Heat recovery is recommended for types exceeding 8000 N cu m/hr. When fume enters the incinerator, oxygen in the fume is consumed for combustion of fuel by the burner. Therefore, when O2 in the fume is less than 10%, air must be supplied. When incineration continues at 650-750 C for 0.3-0.5 sec, oxidation decomposition of the fume takes place at more than 99.9% efficiency, breaking into carbon dioxide and water. The incinerator's cost is 1/5-1/6 of the cost when gas is used. Heat recovery using a heat exchanger is even more economical. Solvent fumes should be 1000 ppm, 500 ppm as a minimum. Higher concentrations of solvent lower the fuel cost because of its own calorific value.

**28684** **APTIC NO. 50881**

Suzuki, Takashi

PROBLEMS OF THE COUNTERPLAN AGAINST EXHAUST GASES FROM DIESEL ENGINES. *(Diizeru Kikan ni okeru haiki taisaku no mondaiten). Text in Japanese. Nippon Kikai Gakkai-shi (Journal of the Japanese Society of Mechanical Engineers) (Tokyo), 76(653): 594-602, May 1973. 21 refs.*

The amount of hydrocarbons emitted by evaporation of fuel probably does not matter in diesel engines, because the fuel used in light oil with an initial boiling point of 200 C. Carbon monoxide is less than 1/10th the amount from a gasoline engine. Thus, control methods for diesel engines chiefly focus on black smoke and nitrogen oxides. Two-stage combustion, delaying fuel injection, changing initial combustion conditions, and changing combustion operation are methods for controlling NOx. The supercharger engine is considered. However, the air suction temperature of the supercharger is usually 120 C and the amount of oxygen increases NOx formation, thus making necessary use of a cooler.

**28685** **APTIC NO. 50930**

Suzuki, Teruo

HIRT-SOKEN INCINERATOR DEVELOPED AS AN ANTI-ORGANIC SOLVENT ODOR MEASURE. *(Yuki yozai akushu taisaku to shite kaihatsu sareta Hahto soken inshinereta ni tsuite). Text in Japanese. Akushu no Kenkyu (Odor Research J. Japan), 2(9):52-62, Jan. 1973.*

The design, operation, and applications of a fume incinerator are reviewed. The incinerator is designed to treat fumes containing pollutants, especially those that contribute to photochemical smog, and has an efficiency of greater than 99.9%. The operating costs are low, and if combined with a heat exchanger, heat recovery values of 45, 60, and 80% can be attained. The incinerator can be used as a control in various industries including paint and varnish manufacturing, chemical processing, oil refineries, metal plating, construction material manufacturers, rubber manufacturing, heat treatment of metals, foam rubber curing, sewerage treatment plants, paper manufacturing, food processing, and pharmaceuticals manufacturing.

**28686** **APTIC NO. 50436**

Terakawa, Katsumi

PUBLIC NUISANCE PREVENTION EQUIPMENT (CHIEFLY FANS, SCRUBBERS, PUMPS) VIEWED FROM THE STANDPOINT OF PLASTIC MATERIALS. *(Purasuchikku zairyo kara mita kogaiboshikiki (Shutoshite fan, sukurabba, ponpu)). Text in Japanese. Preprint, Japan Welding Assoc., Tokyo, 14p., 1973. (Presented at the Seminar on Plastics Used in Public Nuisance Prevention Devices and Their Processing Techniques, Osaka, Japan, Feb. 19-20, 1973.)*

The use of plastics as a construction material for pollution control equipment such as fans, scrubbers, and pumps is discussed. Polyvinyl chloride, polyethylene, polypropylene, fiber glass reinforced plastic, and other types of plastic are discussed including tensile strength, impact strength, coefficient of linear expansion, heat resistance, water absorption, combustibility, and corrosion resistance. A scrubber made of polyvinyl chloride is discussed as an example.

**28687** **APTIC NO. 50946**

Trapp, Guenter

COOLING WITH ATMOSPHERIC AIR IN THE COLD SEASONS AND REGENERATIVE HEAT EXCHANGE. *(Freie Kuehlung und regenerativer Waermetausch). Text in German. Heizung-Lueftung-Haustech., 24(4):119-122, April 1973.*

Design and construction problems of ventilation and air conditioning systems have been solved. What remains to be solved is the reduction of costs and of the pollution of the environment through heat and combustion residues. For this reason cooling by the free cooling potential of the ambient air in winter and regenerative heat exchange are discussed in connection with a high-pressure induction air conditioning system for an office building. In the first case ambient air is passed to the first preheater and brough to a temperature plus 5 C. It then goes to the heat exchanger. A second preheater raises the temperature to the degree desired prior to entry into the moisturizer. Regenerative heat exchange uses the enthalpy difference between outside air and waste air for balancing the temperature of two air flows. The two heat flows must cross each other for the purpose of heat exchange. The use of a regenerative heat exchanger brings high savings of operating costs and a considerable reduction (90%) of the installed capacity for heating and moisturizing ambient air. Nothing is saved in this respect with free cooling. Through free cooling, however 95 Gcal of heat can be recovered/yr, and an equally high amount of cold air.

**28688** **APTIC NO. 50763**

Tsuji, S.

SUPPRESSION OF NITROGEN OXIDES GENERATION. *(Chisso sankabutsu no seisei yokusei). Text in Japanese. Netsu Kanri to kogai (Heat Management Public Nuisance), 25(5):10-20, May 1973. 2 refs.*

New combustion methods for suppression of nitrogen oxide emissions were tested, including pressure jetting, divided flame method; steam jetting, divided flame method; steam jetting by stages, long flame method; combined combustion in a circulating whirlpool; circular plane flame method; and fan shape plane flame method. These methods can be applied to gas turbines, jet engines, gas burners, boilers furnaces, and other fixed combustion equipment. The divided flame methods, both under pressure jetting and steam jetting, produced less dust and much less $NO_x$, since flame temperature is lowered and nitrogen and oxygen stay within the flame for shorter time periods. Although suppression of fuel $NO_x$ was impossible even with improved combustion technology when the $O_2$ concentration was the same, divided flame methods do suppress fuel $NO_x$ generation greatly, probably due to the shorter period of time in the flame.

**28689** **APTIC NO. 50488**

Tsuruta, Toshiyuki

PROBLEMS OF THE ANTI-POLLUTION POLICY IN THE SULFURIC ACID INDUSTRY. *(Ryusan gyokai ni okeru kogai taisaku no shomondai). Text in Japanese. Kogai Boshi Sangyo (Environ. Pollution Control), 3(3):15-25, March 1973.*

The sulfuric acid manufacturing process is described including chemical reactions, pollutants, and pollution control. In 1972, 6,909,000 tons of sulfuric acid were produced. Demand for $H_2SO_4$ is expected to increase at a 3-4% annual rate. Laws have been passed to reduce sulfur oxides, nitrogen oxides, effluents, and cinder emitted by the $H_2SO_4$ process. Sulfur dioxide can be absorbed and recovered as $SO_2$, $H_2SO_4$, or sulfur. Dilute acid obtained during refining of sulfur-containing ore can be neutralized or recovered.

**28690** **APTIC NO. 50735**

Uchiyama, Haruo, Tetsuya Watanabe, and Hideo Kubo

GAS ABSORPTION EQUIPMENT. *(Gasu kyushu sochi). Text in Japanese. (Ishikawajima-Harima Heavy Industries Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 48-7185. 4p., March 3, 1973. 1 ref. (Appl. July 31, 1969, 1 claim).*

Sulfur dioxide and other gases can be absorbed by contacting the exhaust gas with a powdered absorbent in an absorption tower. The equipment consists of an absorption tower, separator, dust collection device, blower, and stack. The absorbent is recovered for reuse. An adequate number of column stages are mounted inside cyclones, which increases the absorption of $SO_2$ and increases collection of the absorbent for reuse.

**28691** **APTIC NO. 50669**

Walkenhorst, Wilhelm

SOME PROPERTIES OF A FILTER WITH HIGH FLOW RATES. *(Ueber einige Eigenschaften eines Filters mit hoher Anstroemgeschwindigkeit). Text in German. Staub, Reinhaltung Luft, 33(4):158-163, April 1973. 4 refs. (Presented at the Internationalen Staubtagung, Bonn-Bad Godesberg, West Germany, Sept. 26-28, 1972.)*

A filter is described which is made from a fine wire mesh between 4 and 0.53 mm. It is operated at a flow rate of up to 17 m/sec. This flow rate is only possible when an adhesive is used. In this manner the majority of the particles striking against the filter adhere to it. Without an adhesive the separation efficiency is nil. Very useful are different light oils at room temperature, for instance, olive oil. The adhesive may be atomized or applied to the wire mesh in the form of a thin oil film. In the case of coal dust, for a particle size of 1 micron a separation efficiency of 90% and higher can be achieved. The separation efficiency is slightly lower in the case of schist dust. The dust distribution and also the pressure difference are determined in tight individual sections. The storing capacity of the filter is high.

**28692** **APTIC NO. 50866**

Watanabe, Yasushi and Takuitsu Nishikawa

PURIFICATION DEVICE FOR HEATED GAS. *(Kanetsugasu no siejo sochi). Text in Japanese. (Nippon Kogei Kogyo K. K., Tokyo (Japan)) Japan. Pat. Sho 48-11550. 3p., Apr. 13, 1973. (Appl. Dec. 16, 1969, 1 claim).*

A device consisting of a water spray unit, an electrostatic precipitator, a venturi scrubber, ducts connecting these units, and a discharge duct is described for cleaning heated gases containing pollutants emitted during paint drying. The gas enters the water spray unit where it is cooled and where the resin contents are solidified and separated. The solids not separated during this process are removed by the precipitator. The dust is collected by a water membrane along each electrode plate. The gas then enters the venturi scrubber where water falling from the precipitator becomes atomized as it passes through the throat section. The gas is mixed with the atomized water, and thus scrubbed. The dirty water enters a water tank and the clean gas is discharged into the atmosphere through the discharge duct.

**28693** **APTIC NO. 50828**

Worthington, Robert B.

AUTOGENOUS SMELTING OF COPPER SULFIDE CONCENTRATE. *Bureau of Mines, Albany, Oreg., Albany Metallurgy Research Center, RI 7705, 24p., 1973. 11 refs.*

A more efficient copper smelting practice was studied that would help meet the increasingly stringent antipollution standards. Continuous smelting to copper and a 0.8 to 0.5% copper slag using pure oxygen was demonstrated for several hours at a time in a unique double furnace, which was devised to overcome the heat losses inherent in a laboratory furnace. The use of pure oxygen to effect the smelting and conversion of copper sulfide concentrate in a single unit to produce blister copper and a very high sulfur dioxide concentration provides a much reduced gas volume for more economical and thorough sulfur recovery. Copper passing out of the furnace in the form of vapor and dust is not excessive and would be lessened in a larger furnace with greater distance between the flash smelting area and flute opening. Continuous oxygen smelting can be conducted in a totally enclosed unit with a smaller flue and gas-cleaning system, compared to present-day plants. Since the sulfur dioxide in the flue gas is highly concentrated, economic recovery and superior cleaning of the effluent can be expected. Althouth the process was successfully demonstrated for several hours at a time, extended test work using longer runs will be required to balance the system and to obtain test data for adequately demonstrating its technical feasibility. (Author abstract modified)

**28694** **APTIC NO. 50399**

Yamada, Masayuki, Tsuneo Shirai, and Saburo Yanagisawa

OXIDATION AND SCRUBBING OF NITROGEN OXIDES. *(Chisso sankabutsu no sanka, suisen jokyoho ni kansuru kenkyu). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 684, 1973. (Presented at the Japan Chemical Society, Spring Meeting, 28th, Tokyo, Japan, April 1-5, 1973, Paper 2D42.)*

The efficiency of nitric oxide oxidation to nitrogen dioxide, the amount of adsorption, the lifetime of the catalyst, and atmospheric effects were studied during oxidation and scrubbing of nitrogen oxides. The NO is regenerated from the dissolution of NO2, reoxidized, and removed as an aqueous solution. Five percent NO is diluted with nitrogen to give 100-3000 ppm of NO. A copper oxide-manganese oxide catalyst was used. The 00 cu cm/min flow rate gave 100% oxidation efficiency up to 250 C and 90% at 400 C. Adsorption was higher than 90% up to 200 C, but further increase in temperature caused a decrease to 0 at 400 C. In the two-step process, 90% NOx removal was obtained with a NOx concentration of 100 ppm and 91% with 500 ppm. The combination of catalytic oxidation and water scrubbing is very effective for NOx removal. A three-step removal process should remove 96% of the NOx.

**28695** **APTIC NO. 50438**

Yamada, Morishi

THE SHELL KIT SCRUBBER SYSTEM AND CORROSION RESISTANT FRP. *(Serukitto sukuraba shisutemu oyobi taishoku FRP ni tsuite). Text in Japanese. Preprint, Japan Welding Assoc., Tokyo, 18p., 1973. (Presented at the Seminar on Plastics Used in Public Nuisance Prevention Devices and Their Processing Techniques, Osaka, Japan, Feb. 19-20, 1973.)*

A Shell Kit scrubber system is described made of polyvinyl chloride (PVC), fiber glass reinforced plastic (FRP), or a PVC/FRP combination. The Shell Kit scrubbers have high gas absorption efficiency, low pressure loss, low cost, and perfect corrosion resistant construction. Several types of Shell Kit scrubbers are described including venturi, cyclone, vertical counter-flow, cross-flow, and nitrogen oxide-removing vertical two-tower counter flow types.

**28696** **APTIC NO. 50464**

Yamanaka, Tatsuo

UTILIZATION OF CATALYST IN AIR POLLUTION CONTROL. (1). *(Kogai boshi gijutsu ni okeru shokubai no riyo. (1)). Text in Japanese. Kagaku Kogyo (Tokyo), 24(4):549-555, April 1973. 8 refs.*

Air pollutants can be eliminated using less fuel by catalytic combustion; if the exhaust gas temperature is high, practically no fuel is required. Some catalysts have been studied for nitrogen oxides elimination from nitric acid stack gas. No complete studies have been made on catalysts for NOx control in automobile exhaust or for NOx control when it coexists with sulfur dioxide. Catalytic reactions, catalyst characteristics, and the catalytic oxidation reaction mechanism are discussed. The effectiveness of various precious metal catalysts in the oxidation reaction of methane is compared. Platinum and copper chromate are effective catalysts for the oxidation of isooctane. Nickel oxide can be used to oxidize carbon monoxide. Various metal oxides have been studied for the oxidation of propylene.

**28697** **APTIC NO. 50487**

Yoshida, Shozaburo

UOP RCD ISOMAX PROCESS. *(UOP RCD aisomakkusuho). Text in Japanese. Kogai Boshi Sangyo (Environ. Pollution Control), 3(3):34-42, March 1973.*

The RCD isomax process of the UOP can reduce the sulfur content of heavy oil to 0.3%. Nine major Japanese power companies are going to reduce sulfur content in heavy oil from 0.8% in 1973 to 0.5% in 1976. They will use more liquefied natural gas and naphtha as fuel. Heavy oil consumption will decrease from 58% in 1971 to 24% in 1976. Eventually the sulfur content in fuel oil will have to be reduced from 0.5% to 0.3%, as New York and New Jersey regulations now demand. Two RCD isomax plants operate in Japan. They reduce Middle Eastern oil to 1.0%. The newer plant reduces sulfur content to 0.3% using a new, highly active catalyst and improved flow scheme. The equipment can economically desulfurize many types of heavy oil. The treated fuel has increased volatility and decreased nitrogen and metal content. Reduction to 0.1% sulfur has been accomplished by the RCD isomax process.

**28698** **APTIC NO. 50529**

Yoshida, Toshio and Sadao Shinobuda

A DESULFURIZATION METHOD FOR EXHAUST GAS. *(Haigasu no datsuryu hoho). Text in Japanese. (Mitsui Toatsu Chemicals, Inc., Tokyo (Japan) and Toyo Engineering Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 48-1599. 4p., Jan. 18, 1973. 1 ref. (Appl. July 1, 1967, 1 claim).*

An improved desulfurization method is described which converts sulfur dioxide in boiler exhaust gas into ammonium sulfate. The SO2 is oxidized to sulfur trioxide at 350-450 C in the presence of a vanadium oxide catalyst, then ammonia is added to form ammonium sulfate at 100-200 C with steam. Then the ammonium sulfate is removed with an electric dust collector. An improved method is given to raise the temperature of the exhaust gas to that required in catalytic oxidation using a heat exchanger.

**28699** **APTIC NO. 50740**

Yoshino, T.

ODOR ELIMINATION BY A DEODORIZING RESIN. *(Dasshu jushi o mochiiru akushu jokyoho). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 40(5):441-448, May 1973.*

A deodorizing resin was manufactured for adsorbing or absorbing odorous substances. The brownish pellets, 5-10 mm in diameter, were somewhat bigger than the resin used for ion exchange. Apparent specific gravity was 0.28-0.30. The deodorizing resin can adsorb material such as ammonia and hydrogen sulfide better than activated coal, but coal can adsorb material with larger molecular weights better. The resin can be reused. The resin removes odorous substances by chemical reaction, rather than by physical adsorption, so that adsorption is not affected by temperature or water. The resin used can be regenerated by washing, neutralization, and drying. Some gas chromatograms are given which show that after deodorizing using this resin, no odor is detected.

**28700** **APTIC NO. 50549**

Yoshitomi, Suehiko, Shuji Iwao, Miyoko Kashiyae, and Hiroyoshi Hayashi

THE EFFECT OF A METAL OXIDES PROMOTER ADDITION ON CATALYTIC COMBUSTION OF CARBON MONOXIDE. *(Issanka tanso sesshoku nensho, kakushu kinzoku sankabutsu no joshokubai koka) Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 695, 1973. (Presented at the Japan Chemical Society, Spring Meeting, 28th, Tokyo, Japan, April 1-5, 1973, Paper 3D05.)*

The rate of carbon monoxide catalytic oxidation promoted by various metal oxides was measured, and the reaction mechanism was discussed in terms of the nature of the catalytic promoters. A 1-5% addition of a promoter showed an increase in the rate of CO combustion with copper-chromium oxide-alumina catalyst. The most effective promoter was ferric oxide, followed by nickel oxide, cobalt oxide, and manganese oxide. The activation energy followed this order, and increased from 1.21 Kcal/mole for the Fe2O3 promoted catalyst to 7.07 Kcal/mole for the catalyst without a promoter. Addition of small amounts of halogen to this reaction system caused a linear increase in activation energy with electronegativity of the system for the Fe2O3 promoted catalyst; the activation energy over the CoO promoted catalyst was almost independent of electronegativity. The promoter donates the electron to the adsorbed oxygen according to the Langmuir-Hinshelwood equation. Since n-type semiconductors such as Fe2O3 have large electron-electron interactions, their promoting effect is largely influenced by the addition of halogens with high electronegativity.

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**28701** **APTIC NO. 50572**

Applied Technology Corp., Pittsburgh, Pa.

SO2 FREE TWO-STAGE COAL COMBUSTION PROCESS. APPENDICES. *Environmental Protection Agency Rept. EPA-R2-72-035a, 121p., Aug. 1972. 21 refs.*

NTIS: PB 216329

The design, construction, operation, laboratory studies, process simulation, and economics of a sulfur dioxide-free two-stage coal combustion process are examined. The coal injection system, process instrumentation, and control, sampling, and auxiliary equipment are reviewed. The process consists of slag desulfurization, a Claus sulfur recovery plant, and two-stage combustion incorporating a lime-limestone solution. The combustor offgas, burned to carbon dioxide and water, is cooled and scrubbed prior to emission into the atmosphere.

**28702** **APTIC NO. 50635**

Bureau of Mines, Bartlesville, Okla., Fuels Combustion Research Group

CHARACTERIZATION AND CONTROL OF EMISSIONS FROM HEAVY DUTY DIESEL AND GASOLINE FUELED ENGINES. (FINAL REPORT). *Environmental Protection Agency IAG-0129 (D), Pub-APTD-1513, 228p., Dec. 1972. 5 refs.*

NTIS: PB 219052

Emissions from heavy duty diesel and gasoline fueled engines, and the effectiveness of engine modifications and/or auxiliary devices for reducing emissions were investigated. Definitive engineering information was obtained on the characteristics of seven diesel and two gasoline engines: the diesel engines were operated on a 13-mode and 23-mode procedure; the gasoline engines were operated on a 9-mode and 23-mode procedure for the baseline tests, and the 23-mode procedure in the parametric study. The control parameters, engine modification, and auxiliary devices tested for emission control for diesel engines included injection timing; injector type; fuel pump and nozzle modifications; exhaust gas recirculation, aftercooling; turbocharging; and oxidation type catalytic converters. With gasoline engines tests included: manifold air injection; air-fuel ratio; exhaust gas recirculation, spark timing schedules; and oxidation type catalytic converters. All results and conclusions were based on composite test results.

**28703** **APTIC NO. 51002**

TWO NEW REFINERIES FOR NORTHERN ITALY. GULF AT BERTONICO, BP AT VOLPIANO. *Petrol. Times, 76(1938):4, 6-8, May 19, 1972.*

Two new hydroskimming refineries at Bertonico and Volpiano are described. In the design of the Volpiano refinery constant consideration was given to the problems of pollution control and environmental requirements. Fumes and smoke coming from the furnaces and boilers are all channeled to a single 120-meter high stack to ensure that gas fumes are dispersed above the zone of thermal inversion and over such a widespread area that ground pollution from the refinery in terms of sulfur dioxide is considerably below the limits set by law. An air cooling system was employed instead of water cooling to reduce the quantity of effluent leaving the refinery. The Bertonico plant includes a naphtha and distillate desulfurization plant and a sulfur recovery plant. Flue gas is emitted through a 128-meter high stack.

**28704** **APTIC NO. 50653**

Alford, Joseph Savage, Jr.

THE CATALYTIC REDUCTION OF NITROGEN OXIDES AND OXIDATION OF CARBON MONOXIDE IN AUTOMOBILE EXHAUST SYSTEMS. *Cincinnati Univ., Ohio, Dept. of Chemical Engineering. Thesis (Ph.D.). Ann Arbor, Mich., Univ. Microfilms, Inc., 1972, 258p. 75 refs.*

Kinetics of the carbon monoxide-oxygen reaction on a 0.5% platinum on alpha-alumina catalyst and of the carbon monoxide- nitric oxide reaction on a 0.5% palladium on alpha-alumina catalyst were studied to determine rate equations and the mechanism of reactions. A continuous-stirred-tank-catalytic reactor was used which provided for integral conversions of reactant under isothermal conditions. Chemical analysis was performed by two gas-solid chromatographs connected in series. Operating conditions for the CO-O2 reaction included a 400-600 deg F temperature range, 0.39-2.42% oxygen and 0.15-3.36% carbon monoxide composition range, and a constant system pressure of 800 mm absolute mercury. Operating conditions for the CO-NO reaction included a 600-800 deg F temperature range, 0.06-0.28% nitric oxide and 0.03-0.80% carbon monoxide composition range, and a constant system pressure of 800 mm absolute mercury. Several mechanisms, based on Langmuir's adsorption isotherms, were postulated and tested on the data. Proposed mechanisms were used to determine the surface rate constants and adsorption equilibrium constants as a function of temperature for each reacting species in each reaction studied. The rate equations determined in this study were used to estimate the amount of catalyst required in a two-stage fixed-bed catalytic converter in order to meet the 1976 automobile emission standards for NO and CO.

**28705** **APTIC NO. 50650**

Benedict, G. E., G. R. Kiel, and G. J. Raab

TEST EXPERIENCE WITH A COMMERCIAL NOX DESTRUCTOR. *Atomic Energy Commission, Div. of Operational Safety. Proc. AEC Pollut. Contr. Conf., Oak Ridge, Tenn., 1972, CONF-721030, p. 87-96. 1 ref. (Oct. 25-27.)*

A commercial propane-fired nitrogen oxides reducing system was installed on a uranium trioxide calciner off-gas vent. The installation was done to test the feasibility of using a scaled-up unit to treat the dissolver off-gas. The unit was tested as received and was later modified to get better flame and waste gas mixing. The systems best performance was 300 ppm NOx in stack gas, using a ratio of fuel to air of 1.5 times stoichiometric. The system decolorized the stack emission at about 1400 deg F with excess air and almost no elimination of NOx. (Author abstract)

**28706** **APTIC NO. 50790**

Bremen, P. J.

CLASSIFIED WASTE DISPOSAL. OAK RIDGE Y-12 PLANT. *Atomic Energy Commission, Div. of Operational Safety,Proc. AEC Pollut. Contr. Conf., Oak Ridge, Tenn., 1972, p. 213-220. (Oct. 25-27.)*

A gas-fired incinerator used to destroy dry classified waste was replaced with a paper disintegrator. The waste material consists of paper in loose leaf or book form, IBM cards and printout sheets, typewriter ribbons, carbon paper, bound booklets, photographs, photographic plates, engravings, offset plates, glass photographic slides, paper clips, rubber bands, wire staples, and binders. The mill destroys 2000 pounds of classified material generated daily at the Y-12 plant, several hundred pounds of material daily from the Oak Ridge Gaseous Diffusion Plant, and overflow material from the Oak Ridge National Laboratory. The roll feeder handles the discharge of the destroyed material from the cyclone separator into the compact without problems, and the bag filter effectively contains any fine particulates not handled through the roll feeder. The daily destruction of 2590 pounds of classified waste is accomplished in less than 6 hrs.

**28707** **APTIC NO. 50796**

Bromley, L. A.

USE OF SEA WATER TO SCRUB SULFUR DIOXIDE FROM STACK GASES. *Int. J. Sulfur Chem., Part B, 7(1):77-84, 1972. 9 refs.*

The feasibility of using seawater to scrub sulfur dioxide from stack gases was examined. The process design, effect of pH value, chemical reactions of SO2 and sea salts, potential problem areas, costs, operating procedures, and technical data for the equipment are reviewed. The feasibility of the process was established, but further research is necessary to determine the effects of oxygen and carbon dioxide on absorption, aeration, the biological aspects, and the catalytic data.

**28708** **APTIC NO. 50803**

Choat, E. E.

SOX AND PARTICULATE EMISSIONS. Y-12 AND ORGDP PLANTS. *Atomic Energy Commission, Div. of Operational Safety, Proc. AEC Pollut. Contr. Conf., Oak Ridge, Tenn., 1972, p. 51-61. (Oct. 25-27.)*

The major sources of sulfur oxides and particulate emissions at the Y-12 and ORGDP steam plants, areas of noncompliance with emission standards, and plans for modification to achieve compliance are reviewed. The Y-12 steam plant is equipped with electrostatic precipitators for particulate control and was partially converted to fire both natural gas and pulverized coal. The plant effluent meets the visible emission standards and should have no difficulty meeting the 1973 sulfur dioxide regulation. To meet the 1977 requirements, the plant will be converted to oil firing, at an estimated cost of $2 million. Visible emissions from the ORGDP plant are in compliance with the standards for particulate emissions. Low-sulfur content coal is used to achieve the SO2 emission regulations. This plant will also be converted to oil firing, with heating with hot water as an economically attractive alternative plan.

**28709** **APTIC NO. 50747**

Echizenya, Sadayoshi and Shuichi Kamoshida

STACK GAS CLEANER. *(Haien jokasochi). Text in Japanese. (Hitachi Plant Construction Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-34957. 3p., Oct. 23, 1972. (Appl. Nov. 19, 1970).*

A stack gas cleaner is described which is a combination of wet- type mat filter and an electrostatic precipitator. The precipitator is smaller than normal precipitators and is used to enlarge dust particles through electrostatic coagulation, not to remove them directly. Negative electrodes are provided with water-spray nozzles to wash dust from the electrode whenever necessary. This ensures high dust removal efficiency and prevents spark discharge that can damage the electrodes. The mat filter is above the precipitator, fitted across the interior of an upright stack. It removes the larger particles.

**28710** **APTIC NO. 50580**

Fattore, Vittorio and Bruno Notari

ATMOSPHERIC POLLUTION FROM AUTOMOTIVE VEHICLES. STATE-OF-THE-ART AND SOLUTIONS OF THE PROBLEM. *(Inquinamento atmosferico da autovetture. Stato del problema e soluzioni). Text in Italian. Chim. Ind. Milan, 54(11):1000-1008, Nov. 1972. 20 refs.*

Automotive vehicle-generated air pollution and its abatement related aspects are reviewed. Graphs describing the air/gasoline ratio-dependent variations of hydrocarbon, carbon monoxide, and nitrogen oxide emissions, as well as statistics itemized per tank, carburetor, crankcase, and exhaust-generated pollutant levels in the U. S. are presented. Engine testing procedures in the U. S. (the seven-mode seven-cycle warm-up) and in Europe (the Europe cycle test) are described. Pollution abatement is discussed in terms of the same items. As opposed to the U. S. where activated charcoal filters are applied to control tank-generated HC emissions, no such devices were used in Europe through 1972. Only recent car models in Europe are provided with charcoal filters for this purpose. In both the U. S. and Europe0 crankcase emissions are controlled by means of a tube joining the crankcase to the air filter. While carburetor and crankcase emissions are under control, the exhaust problem still requires wide range studies. Attention is focused on the afterburning of HC and CO and on the reduction of NOx. Utilization of appropriate catalysts would provide a drastic decrease in lead emissions. Provisions along this line were made in Germany, Sweden, Norway and Switzerland in 1972. Abatement of NOx levels can be achieved by partial exhaust recirculation or by catalytic reduction to nitrogen. Attention is now slanted toward copper layered special steel, monel alloy (70% nickel and 30% copper) catalysts or toward the utilization of the catalyst used for HC and CO oxidation, prepared by other procedures and placed in a separate bed, close to the exhaust collector. Solid particle emissions including lead compounds, iron oxides, and carbon particles can be controlled by cyclone separators; this problem will become minor when lead-free gasolines appear on the market. By 1975, CO, HC, NOx, and solid particle emissions will be limited to 3.4, 0.4, 3, and 0.1 g/mi: respectively, in the U. S.

**28711** **APTIC NO. 50497**

Go, Kiyohide

ELECTRIC PRECIPITATOR. *(Denki shujinki). Text in Japanese. (Matsushita Seiko K. K., Osaka (Japan)) Japan. Pat. Sho 47-26036. 2p., Aug. 11, 1972. (Appl. Dec. 29, 1966).*

In a conventional electric precipitator, the negative terminal of the high-voltage direct current power source is grounded via the casing of the electric precipitator. Accordingly, the casing is held electrically at a negative potential, as are the dust-collecting electrodes. Thus, the casing itself tends to attract dust and becomes dirty. The grounding arrangement in the new electric precipitator described is diametrically opposite to that in a conventional counterpart. The positive terminal of the high-voltage DC power source is grounded via the casing so that the casing may be positively charged. Therefore, the casing does not attract dust and can easily be kept clean. This makes maintenance much easier. Since the casing is charged positively, it is coated with an insulation material in order to prevent possible electric shocks.

**28712** **APTIC NO. 50481**

Hagiwara, Dadachika

**DEVICE TO PROTECT FROM DUST.** *(Jinai shinnyu boshi sochi). Text in Japanese. (Tokyo Shibaura Electric Co., Ltd., Kawasaki, Kanagawa Prefecture (Japan)) Japan. Pat. Sho 47-[illegible] 2p., Aug. 15, 1972. (Appl. Dec. 18, 1969).*

A device is described for protecting electric appliances such as TVs, radios, and oscilloscopes from outside dust which can enter these appliances through vents. The internal parts of the appliances are electrically charged using permanently charged electret elements to attract dust entering the vents and to hold the dust before it can reach the internal components of the appliances. The optimum vent size is 2-4 mm wide for a rectangular [illegible] of [illegible] mm in diameter for a round vent.

**28713** **APTIC NO. 50000**

Harrington, R. E.

**CURRENT STATUS OF SULFUR DIOXIDE CONTROL TECHNOLOGY.** *Int. J. Sulfur Chem., Part B, 7(1):57-66, [illegible]*

The status of various sulfur dioxide control methods is reviewed. Data on SO2 removal capability as a function of operating conditions and process reliability, life, and capital and operating economics were examined for low sulfur fuels usage as a control, dry limestone injection, lime scrubbing, limestone scrubbing, magnesium oxide scrubbing, catalytic oxidation, the manganese oxide process, the wet char sorption-regeneration process, the Wellman-Lord (sodium sulfite) process, sodium hydroxide scrubbing, activated carbon adsorption-catalytic oxidation, ammonia scrubbing, molten carbonate scrubbing, the sodium citrate process, and advanced power cycles.

**28714** **APTIC NO. 50999**

Hatta, Keizo

**EXHAUST GAS PURIFICATION METHOD FOR SPARK IGNITION ENGINE.** *(Hibana tenka kikan no haikigasu jokasochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-40207. 4p., Oct. 11, 1972. (Appl. Aug. 3, 1970, 1 claim).*

A method for the control of carbon monoxide, hydrocarbons, and nitrogen oxide emissions from spark ignition engine exhausts is presented. With a conventional spark ignition engine, the air-fuel ratio remains unchanged throughout the complete cycle of compression, combustion, and expansion strokes. In the modified system, the ratio is set thicker for spark combustion and is then leaned with a supply of secondary air during the expansion stroke. With combustion of the richer air-fuel mixture, NOx emissions are modified. The CO and hydrocarbons generated within this step are combusted with the secondary air fed in during the expansion stroke and are reduced to water or steam and carbon dioxide. Injection valves are provided for the injection of the secondary air into the combustion chamber and may be controlled either mechanically or electrically.

**28715** **APTIC NO. 50491**

Honma, Tomizo

**AIR CLEANER.** *(Kuki seijo sonchi). Text in Japanese. (Tokyo Shibaura Electric Co., Ltd., Kawasaki, Kanagawa Prefecture (Japan)) Japan. Pat. Sho 47-24672. 3p., Aug. 3, 1972. (Appl. Nov. 16, 1968).*

A room air cleaner using an activated carbon filter which can be regenerated by an infrared lamp is described. The cleaner takes indoor air through an intake port on the front side, filters the air by activated carbon in the interior of the cleaner, and discharges the air through the discharge port in the top side. Then the used activated carbon rolls to the rear half of the cleaner where it is irradiated by infrared light for separation of the adsorbed pollutants and humidity. The pollutants are discharged into the outdoor air.

**28716** **APTIC NO. 50911**

Hori, Kenji

**EXHAUST GAS PURIFICATION METHOD FOR A SPARK IGNITION INTERNAL COMBUSTION ENGINE.** *(Hibanatenka shiki nainenkikan no haiki joka hoho). Text in Japanese. (Mitsubishi Automobile Industry Co., Ltd. (Japan)) Japan. Pat. Sho 47-42402. 3p., Oct. 26, 1972. (Appl. April 6, 1970, 1 claim).*

Air is injected into the upper part of the piston from the end of the intake stroke to the start of the compression stroke to generate appropriate air currents, thus forming an air stratum around the upper part of the piston to realize stratified combustion. The air is also injected from the end of the expansion stroke to the start of the exhaust stroke to form an air stratum around the exhaust gas, thereby cleaning the exhaust gas. The injected air also gives a sealing effect to avoid the flow of crankcase or blowby gas.

**28717** **APTIC NO. 50904**

Imamura, Tadami, Yosaburo Iwafuji, and Kazuo Matsui

**METHOD AND DEVICE TO ADJUST TEMPERATURE AND MOISTURE OF GAS.** *(Gasu no choon chositsu hoho oyobi sochi). Text in Japanese. (Mitsubishi Heavy Industries, Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-41504. 5p., Oct. 20, 1972. (Appl. Aug. 26, 1969, 2 claims).*

A method is described to cool and moisten dust-containing gas so the gas can be cleaned with an electrostatic precipitator. The spray tower described solves the problem of varying gas flow by controlling the amount of water sprayed from atomizer nozzles by monitoring the gas temperature. Steam spray nozzles are installed in a radial arrangement below the atomizer nozzles. A thermocouple unit across the bottom of the tower detects the gas temperature distribution and controls the steam. When an uneven temperature distribution of gas occurs after the moistening treatment, the steam spray nozzles are automatically controlled to increase the steam spray in needed areas so that the gas may be held above the steam curtain long enough to be moistened with more water. The steam curtain also controls the gas flow.

**28718** **APTIC NO. 50649**

Jacobsen, W. R.

**NOX RELEASES AND CONTROLS AT THE SAVANNAH RIVER PLANT.** *Atomic Energy Commission, Div. of Operational Safety, Proc. AEC Pollut. Contr. Conf., Oak Ridge, Tenn., 1972, CONF-721030, p. 122-133. 3 refs. (Oct. 25-27.)*

Nitrogen oxides emissions and their control at the Savannah River Plant are discussed. The NOx releases occur from three sources: coal combustion for steam and electricity generation -- released as nitric oxide; metal cleaning operations in nuclear fuel fabrication processes -- released as nitrogen dioxide and NO-NO2-nitric acid mixtures; and metal dissolution and chemical processing of irradiated fuel -- released as NO2 and NO. Calculated ambient air concentrations at the plant boundary resulting from these emissions are within the South Carolina standards. Efforts to minimize releases by off-gas treatment consist of an acid recovery unit on the separations area NO2 source, and a water scrubber on one of the HNO3 sources in the fuel fabrication area. About 50% reduction in NOx emissions was gained in the fuel fabrication area by replacing an acidic metal cleaning operation by a shellblast technique. Concentrations of nitrogen oxides and nitric acid in the vicinity of the fabrication buildings were reduced by installing 100 ft plastic stacks on all sources in that facility. (Author abstract modified)

**28719** **APTIC NO. 50465**

Kaji, Katsuhisa

**AUTOMOBILE EXHAUST GAS CLEANER.** *(Jidosha haikigasu jokasochi). Text in Japanese. (Nisshin Kogyo Co., Ltd., Yamato (Japan)) Japan. Pat. Sho 47-24172. 3p., Aug. 1, 1972. (Appl. April 11, 1969).*

A catalytic afterburner for automobiles is discussed which features a bypass channel so that the exhaust gas normally fed into the afterburner will be bypassed when the gas contains only negligible amounts of harmful gases such as carbon monoxide and hydrocarbons. This avoids unnecessary exposure of the catalyst to the exhaust gas, thus prolonging the catalyst s life. At idling, low-speed drive, or high-load valve, a flow channel control valve selects the channel to the catalytic afterburner for removal of CO and HC, while the air pump is activated. During constant driving, the exhaust gas flows through a lower branch pipe that is the bypass channel, and is not sent to the afterburner.

**28720** **APTIC NO. 50517**

Kaji, Katsuhisa

SECONDARY AIR FEEDER DEVICE IN AUTOMOTIVE EXHAUST GAS CLEANER. *(Jidoshayo haikigasu seijosochi ni okeru nijikuki kyokyusochi). Text in Japanese. (Nisshin Kogyo Co., Ltd., Yamato (Japan)) Japan. Pat. Sho 47-24173. 3p., Aug. 1, 1972. (Appl. June 13, 1969).*

The secondary air feeder device for an afterburner exhaust gas cleaner is designed to provide a necessary amount of secondary air for effective afterburning of the exhaust gas according to opening of the throttle valve of the carburetor. An air pump for the secondary air is linked to the engine by means of a fan belt and pulleys so that it may be driven by the engine. The secondary air feeder pipe connects the air pump to the exhaust pipe and is equipped with an air flow control valve. This control valve comes in a cylinder with a slide valve that can be slid to open, close, or limit the secondary air feeder pipe. The stroke of the slide valve is controlled by a solenoid device linked to the limit switch. A specially designed cam plate is fitted onto the rotary shaft of the throttle valve of the carburetor. The cam plate thus turns with the throttle valve shaft. The distance the cam plate will turn is determined by the opening of the throttle valve which varies according to drive modes such as idling, acceleration, and constant-speed driving. When turned with the throttle valve for different turning angles, the cam plate comes in contact with one of three limit switches which becomes activated to move the slide valve to open, close, or limit the secondary air feeder pipe, thus controlling quantity of the secondary air according to the opening of the throttle valve.

**28721** **APTIC NO. 50882**

Kamata, Rinpei and Shosaburo Yoshikawa

METHOD TO MANUFACTURE MAGNESIUM SULFATE, USING SULFUR DIOXIDE GAS. *(SO2 gasu o riyoshite ryusankudo o tsukuru hoho). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-41826. 4p., Oct. 23, 1972. (Appl. May 13, 1969, 1 claim).*

A method of manufacturing magnesium sulfate is described which uses sulfur dioxide emitted from a power plant or smelting work. The SO2 is absorbed by waste asbestos ore to produce MgSO4 containing water soluble magnesium oxide. The waste asbestos ore is primarily composed of serpentine asbestos with some magnetite, chromite, and pyroxene. It is also possible to apply this method to serpentine asbestos.

**28722** **APTIC NO. 50701**

Kato, Yujiro

ACTUAL CONDITION AND PROBLEMS OF THE OPERATION OF A BAG FILTER IN VARIOUS INDUSTRIES. *(Kakushu kogyo ni okeru baggu firuta no unten no jissai to sono mondaiten). Text in Japanese. Kankyo Sozo (Environ. Creation), 2(4):1-7, April 1972.*

Bag filter operation in various industries including carbon black manufacturing, chemical processing, coke drying, rubber manufacturing, cement manufacturing, zinc refining, and electric furnace is described. Operating variables and filtering efficiency are discussed.

**28723** **APTIC NO. 50702**

Kato, Yujiro

A GOOD WAY OF USING A BAG FILTER. *(Baggu firuta no jozu na tsukaikata). Text in Japanese. Funtai to Kogyo (Powder Ind.), 4(11):1-7, Dec. 1972.*

The operation of bag filters in the carbon black industry is described. The bag filtering efficiency can decrease with high water content of the dust-carrying gas. When the water vapor condenses, the filter becomes wet. If the water is mixed with dust, it can become a muddy paste which increases filtering resistance. Therefore, temperatures below the dew point must be avoided. It is generally necessary to keep the gas temperature several times higher than the dew point.

**28724** **APTIC NO. 50799**

Khalafalla, S. E.

ABATEMENT OF SULFUR DIOXIDE POLLUTION BY REDUCTION WITH CARBON MONOXIDE. *Int. J. Sulfur Chem., Part B, 7(1):41-50, 1972. 12 refs.*

The reduction of sulfur dioxide with carbon monoxide was studied with respect to the reaction thermodynamics, catalyst activity and efficiency, engineering factors, and process application. The main reaction is strongly exothermic and requires a contact catalyst. In the absence of a catalyst, the reduction proceeds very slowly, even at elevated temperatures (800 C). At lower temperatures, alumina in various slightly hydrated and acid-soluble forms was efficient as a catalyst. An iron alumina catalyst was optimized for reduction at low SO2 concentration levels. The catalyst was tested to determine the catalytic sites on alumina and to study the activity of the catalyst with respect to sulfur activation, incorporation of sulfur in the iron component, material balance of the reaction products (carbonyl sulfide, carbon dioxide, and carbon disulfide), the effects of a nitrided and a carbided iron catalyst, and chemisorption of carbon monoxide on iron. Other potential catalysts for SO2 reduction were also studied.

**28725** **APTIC NO. 50498**

Kitamura, Shiro and Toshio Shibahara

ELECTRIC POWER FEEDER DEVICE FOR DUST-COLLECTING ELECTRODE PLATES OF ELECTRIC PRECIPITATOR. *(Denki shujinki no shujinban no kyudensochi). Text in Japanese. (Matsushita Seiko K. K., Osaka (Japan)) Japan. Pat. Sho 47-26038. 2p., Aug. 11, 1972. (Appl. July 11, 1968).*

A feeder device for an electrostatic precipitator is described which is a conductor frame with easily detachable electrode plate holders featuring easy removal and installation of the electrodes. Electrodes must be frequently cleaned of collected dust to maintain efficiency. This feeder device permits the easy replacement of the electrodes for such periodic cleaning.

**28726** **APTIC NO. 50704**

Kobayashi, Akira, Toshio Suzuki, Minoru Morita, and Takakado Takeshita

EXHAUST GAS PURIFICATION DEVICE FOR AN INTERNAL COMBUSTION ENGINE. *(Nainenkikan no haikigasu jokasochi). Text in Japanese. (Toyota Central Research Labs., Nagoya (Japan)) Japan. Pat. Sho 47-38645. 13p., Sept. 29, 1972. (Appl. July 6, 1970, 2 claims).*

An automotive exhaust gas purification device is described which supplies extra oxygen to the air/fuel mixture according to the engine operating mode to ensure complete combustion and prevent carbon monoxide and hydrocarbon emissions. In conventional engines, CO and HC emissions are high when the throttle valve opening is less than 1/4 or greater than 3/4. In the invention, control of the oxygen supply is made by detecting the pressure in the intake pipe of the carburetor that varies with engine operating mode. Pressure in the venturi section of the carburetor and below the throttle valve is detected; the additional amount of oxygen is controlled by adjusting the throttle valve opening accordingly.

**28727** **APTIC NO. 50743**

Kobayashi, Shinji

CONNECTOR OF EXHAUST DUCT IN EXHAUST STACK SYSTEM. *(Haikisochi ni okeru haikito no setsuzoku kiko). Text in Japanese. (Sanki Sangyo Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-29628. 2p., Sept. 5, 1972. 1 ref. (Appl. June 11, 1968).*

The exhaust system in tall buildings is generally composed of many short exhaust stacks, generally one per floor. A method of connecting these stacks is described. The upper end of the duct is wider in diameter than the lower end, so the lower end of a duct can be inserted in the upper end of the duct below it. The joint is caulked. The connected stack gives greater dispersion of stack gas than individual stacks.

**28728** **APTIC NO. 50998**

Manabe, Masami

EXHAUST GAS PURIFICATION DEVICE FOR INTERNAL COMBUSTION ENGINE. *(Nainenkikan haikigasu jokasochi). Text in Japanese. (Nippon Denso K. K., Kariya Aichi (Japan)) Japan. Pat. Sho 47-39372. 3p., Oct. 4, 1972. (Appl. Oct. 16, 1968, 1 claim).*

An exhaust gas purification system consisting of a spark advance and delay mechanism and modified carburetion was developed. In the conventional device of this type, control is not complete, especially during rapid deceleration, since the spark advance mechanism is momentarily activated simultaneously with the spark delay mechanism. The spark delay mechanism may also become activated in the idling mode, when exhausts are not high, thus resulting in an abnormal temperature rise of the cooling water. In the modified system, a vacuum switch in the pipeline connects the negative pressure induction port of the distributor with the carburetor port and is programmed to operate in response to the negative pressure in the intake pipe.

**28729** **APTIC NO. 50518**

Matsuo, Seiji

ELECTRIC PRECIPITATOR. *(Denki shujinki). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-25092. 5p., Aug. 5, 1972. (Appl. Dec. 28, 1968).*

This electric precipitator features specially designed and arranged dust-collecting and discharge electrodes giving higher dust collection efficiency with minimized scattering of dust. It requires discharge electrodes numbering only 1/2 or 1/3 of those required for an ordinary electric precipitator, thus economizing power consumption. It uses several rows of dust-collecting electrodes, each row consisting of a number of U-shaped plates. These U-shaped plates are connected to one another in the opposite position to make a row of dust-collecting electrodes. The next row of dust-collecting electrodes is placed in parallel to the first row but in such a way that there may alternately be a narrower space and a wider space formed between the two rows. The third row is arranged in the similar manner against the second, and the fourth against the third, and so on. Between each two rows of the dust-collecting electrodes are the discharge electrode plates and high-voltage electrode plates, the former installed at the center of each wider space formed between the two rows and the latter installed at the center of the narrower space. The former is installed in the vertical direction against the flow direction of the gas while the latter is in the same direction with the flow of the gas. With this setup, the dust removal efficiency is 94.2% when not hammering, and 75% when hammering. It is 92% and 60%, respectively, with an electric precipitator of another design.

**28730** **APTIC NO. 50466**

Matsusaka, Hiroichi

POLLUTION AT WAKAYAMA STEEL MILL OF THE SUMITOMO METAL INDUSTRIES, LTD. *(Sumitomo Kinzoku Wakayama Seitetsusho no kogai ni tsuite). Text in Japanese. Sumitomo Sangyo Eisei (Sumitomo Bull. Ind. Health), no. 8:100-102, April 1972.*

By 1971, 500,000,000 dollars were spent on pollution control at the Wakayama Steel Mill of Sumitomo Metal Industries, Ltd. High stacks are used to increase sulfur oxide diffusion. Low sulfur oil and desulfurization of coke oven gas are carried out. The sulfur content in heavy oil is now 0.6%, which is to be reduced to 0.5% in March of 1975. Low sulfur ore is mixed in a sintering process. In 1971, sulfur oxides measured at three nearby monitoring stations were 0.021-0.026, a decrease from 0.039 in 1968. Dust and noise abatement devices are used in the mill. Liquid effluents are also treated, and water is recycled. The mill signed a pollution control agreement with Wakayama s Prefectural and Municipal governments to reduce sulfur dioxide to 0.012 ppm and to reduce dust to 530 kg/hr. Automatic SO2 meters were placed in the flue and connected with Prefectural and Municipal monitors.

**28731** **APTIC NO. 50696**

Misumi, Yoshitaka

EXHAUST GAS PURIFICATION DEVICE FOR AUTOMOTIVE ENGINE. *(Jidoshayo enjin no haikigasu jokasochi). Text in Japanese. (Mikuni Kogyo Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-35122. 3p., Oct. 24, 1972. (Appl. Feb. 13, 1969).*

An automobile exhaust gas cleaner is described which keeps the throttle valve open at a higher level than normal idling (say 1400 rpm), thus reducing pollutants during deceleration or braking. This invention reduces pollutant emitted during engine warm-up. Generally, the starter device of the carburetor provides too thick an air/fuel mixture for the engine in a cool state. Therefore, emissions increase as the engine heats up. This invention controls the throttle so that the optimum air/fuel ratio is obtained during engine warm-up. This also shortens the warm-up period. When the engine is warmed, the throttle opening is automatically returned to the normal idling opening.

**28732** **APTIC NO. 50758**

Mizuno, Norimichi

TWO-STAGE ELECTROSTATIC PRECIPITATOR. *(Nidangata denkishujinki). Text in Japanese. (Hitachi, Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-35113. 3p., Sept. 4, 1972. (Appl. June 28, 1967, 1 claim).*

In a conventional electrostatic precipitator, the particles are positively charged and collected only by the negative electrode. A new precipitator is described which has a discharge line located midway between the negative and positive electrode plates, rather than in front of the positive plate. Particles going through the electric lines of force formed between the discharge line and the negative electrode are positively charged, those going through the lines of force formed between the discharge line and the positive plate are negatively charged. The positive dust is collected by the negative electrode plate and the negative dust by the positive plate. The gas passage is half the size of a normal precipitator which improves dust removal efficiency and reduces the size of the electrostatic precipitator.

**28733** **APTIC NO. 50504**

Moriyama, Aritsune

AXIAL-FLOW PURIFICATION DEVICE FOR FLUID CONTAINING DUST. *(Ganjin ryutai no jikuryu joka sochi). Text in Japanese. (Sanko Kuki Sochi K. K., Osaka (Japan)) Japan. Pat. Sho 47-25088. 2p., Aug. 5, 1972. 1 ref. (Appl. Oct. 26, 1968).*

A centrifugal dust separator which can remove dust from a fluid or gas is described which features high dust removal efficiency. Gas is guided by a guide vane so it flows in spirally, then dust is separated centrifugally. The separated dust flows along the internal wall of the separator tube and falls into the dust collector chamber. Part of the gas flowing spirally along the center of the separator tube goes into the grid tube and the gas discharge pipe. Dust remaining in this part of the gas is then centrifugally separated by the grid tube and blown off through slits toward the internal wall of the separator tube. The clean gas is discharged through the discharge pipe.

**28734** **APTIC NO. 50676**

Muto, Yoshio

ELECTROSTATIC PRECIPITATOR. *(Denki shujinki). Text in Japanese. (Origin Electric Co., Ltd., Tokyo (Japan) Japan. Pat. Sho 47-35759. 2p., Oct. 28, 1972. (Appl. Nov. 20, 1970).*

An electrostatic precipitator is described which eliminates spark discharge between electrodes. Since it is desirable to apply higher voltages to the discharge electrodes for higher dust collection efficiency, the corona discharge can become a spark discharge. The new spark discharge current detection/control circuitry is simpler and more effective than the conventional one. The exciter windings are utilized for detection of the spark discharge. The new control circuit consists of a saturable reactor with two exciter windings; it is connected to the power supply circuit and to an exciter circuit supplying exciting current to one of the two exciter windings. The output current of the exciter circuit is controlled by the voltage detected at other exciter winding. This system eliminates the extra circuit required with the conventional system to distinguish surge current of the spark discharge from normal current, since both are simultaneously detected from the current transformer in the conventional system.

**28735** **APTIC NO. 50875**

Nakajima, Yasuo and Yukihiro Eto

DOUBLE CELL-TYPE FUEL INJECTION ENGINE. *(Fukushitsushiki nenryofunsha kikan). Text in Japanese. (Nissan Motor Co., Ltd., Yokohama (Japan)) Japan. Pat. Sho 47-42403. 3p., Oct. 26, 1972. (Appl. Aug. 28, 1970, 1 claim).*

In a conventional double cell-type fuel injection engine provided with a main combustion chamber taking a thinner air/fuel mixture gas (air/fuel ratio, 20-30) and an antechamber of precombustion chamber taking a thicker air/fuel mixture gas (air/fuel ratio, 15 or so), there is no shutoff device in the channel communicating the antechamber and main chamber with each other. Due to lack of such a check device, a lot of harmful exhaust gas is emitted unchecked during the exhaust stroke, thus causing a grave air pollution problem. This invention describes a control valve (the antechamber valve) installed in the channel communicating the antechamber with the main combustion chamber. Operations of the antechamber valve is synchronized with the engine revolution so that it may become closed during the exhaust stroke, thereby preventing such harmful substances as hydrocarbons, carbon monoxide, and nitrogen oxides generated in the antechamber from going out unburned through the main combustion chamber. The antechamber valve is kept closed by means of a pressure spring in the closing direction. As are the intake and exhaust valves, the antechamber valve is operated by a locker arm operated by cam A of the cam shaft. It is arranged so that the antechamber valve may open during the intake stroke in which the intake valve is open and during the compression and expansion strokes in which the intake and exhaust valves are both closed. The antechamber valve is closed by cam C when the exhaust valve is opened by cam B in the exhaust stroke.

**28736** **APTIC NO. 50995**

Nakajima, Yasuo, Yoshimasa Hayashi, and Shinichi Nagumo

AUTOMOTIVE EXHAUST GAS PURIFICATION WITH BY-PASS SYSTEM. *(Baipasu kiko o yusuru jidosha no haikigasu jokasochi). Text in Japanese. (Nissan Motor Co., Ltd., Yokohama (Japan)) Japan. Pat. Sho 47-43090. 4p., Oct. 31, 1972. (Appl. July 28, 1969, 1 claim).*

A modified version of the reactor-type engine exhaust gas purification device for the control of hydrocarbons and carbon monoxide through afterburning is presented. In the conventional afterburners, the exhaust gas is recombusted regardless of operating cycle, thereby decreasing engine power and the service life of the reactor, sometimes unnecessarily. The modified afterburner is activated only when necessary, i.e., only when the engine is at a speed lower than 80 km/h or the intake negative pressure is in the range of 0-150 mm Hg. The device includes the smaller exhaust pipe connected to the outer tube of the reactor and a by-pass channel pipe connected to the inner tube of the reactor. An electromagnetic valve in the larger by-pass channel activates the afterburner under the specified conditions. Under other conditions, the exhaust gas is directly discharged through the by-pass pipe into the muffler.

**28737** **APTIC NO. 51018**

Nakamura, Yasunori and Norifumi Sasamori

ON THE DUST COLLECTIVE EFFECT OF DIELECTRIC FILTER IN ELECTRIC FIELD. *(Denkai-chu ni okeru yudentai firuta no shujin-sei ni tsuite). Text in Japanese. Tokyo Toritsu Kogyo Gijutsu Senta Kenkyu Hokoku (Tokyo Met. Ind. Tech. Center, Res. Rep.), vol. 2:65-69, Dec. 1972. 2 refs.*

Various experiments were conducted on the dust collection efficiency of synthetic fiber filters with electric fields; their excellent dust collection rates were confirmed. The electric field generating parts of known types of static electric air filters combining an electrostatic precipitator and with a mechanical filter are usually made of metals, and high electric pressure cannot be applied. Using the electric property of plastic, a plastic filter dust collector with a plastic electric field generator was developed and constructed. The electric field generator was made of a rigid polyvinyl chloride pipe coiled in the shape of a generator, and suitable pellets were circulated through the pipe creating friction and electricity. The potential could be more than 30 KV, and the effect of humidity was slight. The device is inexpensive and safe. The dust particle size distributions, the difference in the collection rate by the difference in the material of the filter holders, the collection rate by variable electric field and air current velocity, the effects of electric field on various kinds of filters, and dust collection rates for indoor suspended particulates were examined. The market-sold polypropyrene filter with an electric field had 60% dust collection efficiency, and 40-70% was attributed as the effect of electric field.

**28738** **APTIC NO. 50652**

Netzer, W. D.

FLUORINE DISPOSAL METHODS. *Atomic Energy Commission, Div. of Operational Safety, Proc. AEC Pollut. Contr. Conf., Oak Ridge, Tenn., 1972, CONF-721030, p. 62-86. 27 refs. (Oct. 25-27.)*

Safe and economical methods of disposing fluorine presently vented from a uranium oxide conversion facility were investigated. The facility produces uranium hexafluoride by reacting high assay uranium oxides with fluorine. The disposal processes under consideration included caustic scrubbing, fixed bed reactors, and a fluidized bed reactor. A 5 in. countercurrent spray tower was built which can absorb 90% of a standard 3 cu ft/min fluorine flow using a 3 gal/min flow of 5 wt% potassium hydroxide. But the toxic gases oxygen difluoride and nitroxy fluoride are also produced in the scrubber. Fixed bed charcoal and iron reactors were operated, but the charcoal reaction produced large quantities of carbon monoxide, carbonyl fluoride, and silicon tetrafluoride; and the iron reaction produced molten iron which plugged the reactor. Fixed bed reactor systems are hampered by high maintenance costs, and studies utilizing fluidized bed reactors are now being considered. (Author abstract modified)

**28739** **APTIC NO. 50746**

*Okada, Tadashi and Kenji Takeshita*

*EXHAUST GAS CONTROL DEVICE. (Haikigasu seigyosochi). Text in Japanese. (Nippon Denso Co., Ltd., Kariya (Japan)) Japan. Pat. Sho 47-35121. 3p., Oct. 24, 1972. 1 ref. (Appl. Sept. 5, 1968).*

An automotive exhaust control device is described which opens the throttle valve more during acceleration than in the idling mode and which includes an ignition delay device that is automatically activated during deceleration. This device reduces harmful exhaust gases. When speed is lower than a fixed level, negative pressure is led into the throttle valve to narrow the throttle valve opening to that in idling mode; then the atmospheric pressure is led into the ignition delay device to hold it in an off position.

**28740** **APTIC NO. 50500**

Osawa, Wataru and Hisahiko Yamamoto

ROTARY OBLIQUITY TUBE TYPE DUST-REMOVING/DESULFURIZATION DEVICE. *(Shato kaitenshiki jojin datsuryu sochi). Text in Japanese. (Kowa Kenso Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-25711. 4p., Aug. 10, 1972. (Appl. July 7, 1969).*

A rotary tube-type stack gas cleaner is described which removes dust and sulfur dioxide at the same time. Stack gas is taken in through the lower end of the rotary tube, goes through a gas cooling chamber and packed chamber filled with pieces of wood or fine-mesh grids where the soot and dust are removed by the wetted packed material, enters a gas retaining chamber where the cooled gas (60 C) is scrubbed with a solution for SO2 absorption, and is discharged through the upper end of the tube. A blower is in the discharge pipe connecting the rotary tube to a chimney. The scrubbing solution is recirculated for reuse. The scrubbing solution can be regenerated by oxidation or neutralization.

**28741** **APTIC NO. 50648**

Pence, D. T. and T. R. Thomas

NOX ABATEMENT USING AMMONIA WITH ZEOLITE CATALYSTS. *Atomic Energy Commission, Div. of Operational Safety, Proc. AEC Pollut. Contr. Conf., Oak Ridge, Tenn., 1972, CONF-721030, p. 115-121. 5 refs. (Oct. 25-27.)*

A process is described in which zeolites are used with ammonia to selectively catalyze the reduction of nitrogen oxides. The primary advantages of the process are that the reduction is selective for NOx even in oxygen containing effluents, is accomplished at relatively low temperatures, is highly efficient, and requires no additional treatment of the effluent prior to discharge. (Author abstract)

**28742** **APTIC NO. 50651**

Pennak, A. F., N. R. Leist, and R. C. Kispert

REDUCTION OF NITROGEN OXIDES IN VENT GASES BY SCRUBBING. *Atomic Energy Commission, Div. of Operational Safety, Proc. AEC Pollut. Contr. Conf. Oak Ridge, Tenn., 1972, CONF-721030, p. 97-114. 2 refs. (Oct. 25-27.)*

The possibility of more efficient absorption of nitrogen oxides from vent gases through the use of improved scrubbing techniques and various scrubbing mediums was investigated. Additives such as caustic have provided improved scrubbing efficiency compared with water, but utilization or disposal of the accumulated scrubber product has presented distinct problems. Presently undergoing plant-scale testing, 60-90 g/l urea in 2-3 M nitric acid at 125-180 deg F offered greater NOx removal efficiency than any scrubbing medium previously tested. (Author abstract modified)

**28743** **APTIC NO. 50810**

Princiotta, F. T. and M. Epstein

OPERATING EXPERIENCE WITH A PROTOTYPE LIME-LIMESTONE SCRUBBING TEST FACILITY. *Preprint, American Inst. of Chemical Engineers, New York, 80p., Nov. 1972. 12 refs. (Presented at the American Institute of Chemical Engineers, Annual Meeting, 65th, New York, Nov. 26-30, 1972.)*

The performance, reliability, and economics of closed-loop limestone, sodium carbonate, and lime wet-scrubbing processes are evaluated. These processes are used for decreasing sulfur dioxide emissions from power plants and other sources. Operating and design problems such as scaling, plugging, corrosion and erosion were investigated. Test data were generated to characterize scrubber and system performance as a function of the important process variables. Various sludge disposal methods were studied. Mathematical models were developed to allow economic scale-up of attractive operating configurations to full-size scrubber facilities and to estimate capital and operating costs for the scaled-up systems designs. Operating conditions for optimum sulfur dioxide and particulate removal were determined. Long-term reliability testing was performed.

**28744** **APTIC NO. 50794**

Robinson, J. N.

THE HISTORY OF SULFUR DIOXIDE EMISSION CONTROL AT COMINCO LTD. *Int. J. Sulfur Chem., Part B, 7(1):51-56, 1972.*

Sulfur emission control plans implemented by a lead, zinc, and fertilizer producer are reviewed. When the zinc and copper plant was first started, the exhaust gases, containing about 1-2% SO2, were emitted into the atmosphere at a rate of about 140 t/day. When smelter output was increased, stack heights were increased to dissipate the gases. The topography and atmospheric conditions of the area, however, severely limited the efficiency of this method, and the exhaust gases continued to damage the vegetation and farmland in the surrounding areas. The plants then implemented stricter SO2 controls, including the production of sulfuric acid from the flue gases and subsequent combination of this with fertilizer production and absorption of SO2 in aqueous ammonia with further reduction of the SO2 to elemental sulfur. The legal aspects involved with the plant emissions and the operation of the fertilizer plant are also reviewed.

**28745** **APTIC NO. 50631**

Rossbach, R. J. (ed.)

AUTOMOBILE GAS TURBINE - OPTIMUM CYCLE SELECTION STUDY. (FINAL REPORT). *General Electric Co., Cincinnati, Ohio, Space Div. Environmental Protection Agency Contract 68-01-0406, GESP-725FS, APTD-1343, 336p., June 1972. 23 refs.*

NTIS: PB 213370

Gas turbine engines were studied to determine the optimum gas turbine engine capaole of meeting the 1976 Federal standards for unburned hydrocarbons, carbon monoxide, and nitrogen oxides, and to determine the component research and development programs necessary to develop and demonstrate the selected optimum engine and to mass produce vehicles powered by such low emission engines. An analysis and preliminary design program was carried out, beginning with baseline technology or component state of the art, through a screening study of ten engines, a conceptual design study of two engines, a preliminary design study of two engines designed for low NOx emissions, to a recommendation and program plan for engine development. The preliminary design engines were based on two different approaches to reduce the NOx emissions. The PD-1A, a regenerative, single shaft engine with variable stators in the compressor and turbine was provided with a variable bypass around the regenerator for the combustor primary air. This engine weighed 642 lbs complete, had a pressure ratia of 3.2:1 and met the vehicle acceleration requirement with a rated power 134 P. Average fuel mileage was 13.59 mpg, and economic analysis showed that the engine first cost would be $1539 and the net cost of ownership for the engine and automobile $11,776. The PD-2A, a recuperated, free turbine engine with a variable power turbine was designed to limit the combustor inlet temperature to 1000 deg F under all operating conditions. This engine weighed 613 lbs, had a design pressure ratio of 6.6, and met vehicle acceleration requirements with a rated power of 134 HP. Engine first cost was estimated at $1460, and the net cost of ownership for the engine and automobile was $11,848. A plan for the PD-1A engine was delineated for its development and demonstration, including component development, design, and procurement and testing of the engine of dynamometers and in automobiles. (Author summary modified)

**28746** **APTIC NO. 50480**

Saito, Hiroshi

ELECTRIC PRECIPITATOR UTILIZING PERMANENT ELECTROSTATIC CHARGED ELEMENT. *(Eikyu seidenkadentai o riyoshita denki shujin sochi). Text in Japanese. (Nippon Ariko Co., Ltd. (Japan)) Japan. Pat. Sho 47-26442. 2p., Aug. 15, 1972. (Appl. Nov. 15, 1969).*

An electrostatic precipitator is described which consists of a permanent electrostatic element known as electret which resembles a permanent magnet. A number of rectangular, bar-like electret elements are placed horizontally in two rows so that the plus or minus sides face the same direction. Filters are installed before and after each row of elements. A fan is installed before or after the filter/electret element section. As dirty indoor air enters the precipitator, it is filtered, it flows through the gaps between electret elements, and dust is attracted by the elements. The cleaned air is then filtered by a second filter and by a second row of elements. When the electret elements become dirty, they can be washed with water for cleaning. They are recharged to strengthen their electrostatic strength when necessary, and thus can be permanently used.

**28747** **APTIC NO. 50675**

Sakagami, Tsuyoshi

DUST-COLLECTING ELECTRODE OF AN ELECTROSTATIC PRECIPITATOR. *(Denkishujinki no shujin denkyoku). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-34959. 2p., Oct. 23, 1972. (Appl. Nov. 25, 1970).*

An electrostatic precipitator is described which consists of a nappy corrugated dust-collecting electrode plate installed behind ionization lines and discharge electrode plates. The dust-collecting plate is made of short inorganic fibers bonded to a wire netting or perforated iron plate or metal fiber cloth so that the meshes may not be closed with the bonding agent and corrugated to the plate. As stack gases pass through the ionization lines/discharge plates section, dust particulates are positively charged and arrested by the dust-collecting negative electrodes. The arrested dust particles are securely held in the naps. The electrode can be easily cleaned by brushing in the same direction; this eliminates the need for hammering off the dust, which often results in scattering of the dust.

**28748** **APTIC NO. 50697**

Sakamoto, Kiyoshi and Teruo Watabe

WET TYPE DUST COLLECTOR. *(Shisshiki shujinsochi). Text in Japanese. (Sumitomo Shipbuilding Machinery Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-35758. 2p., Oct. 28, 1972. 1 ref. (Appl. March 13, 1969).*

A modified venturi gas scrubber is described whose throat sectional area can be adjusted to meeting fluctuating gas flow volumes. The method described is much simpler and more efficient than previously existing methods for adjusting throat sectional area. The stack gas enters the intake duct, hits the surface of water in the scrubber section, and flows through the venturi section formed between the curved top side and the water surface. It then hits the upright wall of the discharge duct. The scrubbing liquid is injected through the nozzle onto the gas flowing through the venturi section. The sectional area of the throat section is easily adjusted by elevating or lowering the water level. The water level adjustment can be done automatically.

**28749** **APTIC NO. 50797**

Schmidt, Max

FUNDAMENTAL CHEMISTRY OF SULFUR DIOXIDE REMOVAL AND SUBSEQUENT RECOVERY VIA AQUEOUS SCRUBBING. *Int. J. Sulfur Chem., Part B, 7(1):11-19, 1972. 2 refs.*

The aqueous scrubbing-regeneration cycle process for the control of sulfur dioxide in stack gases is examined. The chemistry, engineering, absorption mechanics, the pH dependence of absorption, oxidation of sulfite to sulfate, alternate stripping agents, and process development are reviewed. The reaction mechanisms and kinetics are examined in detail to determine the equilibria and to serve as a base for the development and improvement of the process.

**28750** **APTIC NO. 50757**

Seto, Shozo and Michiyasu Shibata

DRY TYPE DUST COLLECTOR. *(Kanshiki shujinsochi). Text in Japanese. (Nippon Kokan K. K., Tokyo (Japan)) Japan. Pat. Sho 47-35755. 3p., Oct. 28, 1972. (Appl. Dec. 12, 1968).*

A device is described which wets dust collected by a dry dust collector such as a bag filter so the dust will not scatter when being transferred by trucks. Dry dust is reduced to a slurry by this device. Dust collected by bag filters goes into hoppers which are connected to a screw conveyor. The sealed conveyor carries dust into a sealed slurry-making tank with a tray-shaped bottom. Water spray nozzles are connected to the main water pipe and hung into the tank. Water is pumped into the tank and jetted out through nozzles, thus stirring the dust while wetting it. The slurry is recirculated through a sub-tank and slurry pump until the slurry reaches a desirable concentration. The desired slurry is sucked into a vacuum car or truck with a suction pump from the discharge port of the tank.

**28751** **APTIC NO. 50791**

Sherwood, Thomas K.

PROCESSES FOR REMOVAL OF SULFUR FROM COMBUSTION PRODUCTS: THE CHALLENGE TO CHEMISTS. *Int. J. Sulfur Chem., Part B, 7(1):1-9, 1972.*

Abatement technology for the control of sulfur dioxide emissions in stack gases is reviewed. The three major ways to reduce emissions from power plants include replacing the fossil-fueled boilers with nuclear reactors, burning low-sulfur content fuels, and removing the SO2 from the stack gases or during the combustion process. Sources of natural low-sulfur fuels and methods for coal and fuel oil desulfurization are reviewed. For the removal of SO2 from stack gases, the development of alkaline scrubbing, lime processes, the wet limestone process, sulfur removal with by-product recovery, catalytic oxidation, the molten carbonate process, and absorption by liquid reagents with regeneration is reviewed.

**28752** **APTIC NO. 50793**

Slack, A. V.

WORLD STATUS OF RECOVERY OF SULFUR OXIDES. *Int. J. Sulfur Chem., Part B, 7(1):67-75, 1972. 10 refs.*

The state-of-the-art of sulfur oxides removal and recovery from waste gases is reviewed for the USSR, Czechoslovakia, Romania, Western Germany, the Netherlands, France, the United Kingdom, Canada, the United States, and Japan. The various processes include ammonia scrubbing, magnesium oxide scrubbing, adsorption on carbon, absorption by copper oxide, the alkalized alumina process, adsorption in a molten salt mixture (sodium, potassium, and lithium carbonates), treatment with hydrogen sulfide, catalytic oxidation, chamber processing, adsorption and regeneration in fluidized beds, lime scrubbing, and manganese oxide adsorption. The process designs and operation, advantages, limitations, regeneration methods, and recovery products are examined.

**28753** **APTIC NO. 50826**

Springer, Karl J.

BASELINE CHARACTERIZATION AND EMISSIONS CONTROL TECHNOLOGY ASSESSMENT OF HD GASOLINE ENGINES. (FINAL REPORT). Southwest Research Inst., San Antonio, Tex., Emission Research Lab., Office of Air Programs Contract EHS 70-110, Rept. AR-844, APTD-1450, 490p., Nov. 1972. 16 refs.

NTIS: PB 220194

Six 1972 spark-ignited gasoline engines, used in trucks above 6000 lb gross vehicle weight, were subjected to baseline exhaust emissions tests. Two groups of three engines, representing various cylinder configurations and displacements were tested by the current 1972 Federal test procedure, a nine-mode constant speed engine dynamometer test method. The concentrations were then converted to mass emissions for the nine-mode schedule using the 1974 Federal Test Procedure applicable to heavy-duty gasoline engines. Each engine was also tested by an experimental three speed and multi-load schedule with expressions of emissions on a grams/bhp-hr basis. The emissions of interest were unburned hydrocarbons, nitrogen oxides, carbon monoxide, and aldehydes. One popularly used V-8 engine from each manufacturer s group was subjected to a limited series of laboratory tests to demonstrate control device effectiveness. The experimental multi-modal test procedure was employed to evaluate various control strategies, such as basic spark timing, carburetion (air-fuel), air injection, exhaust gas recirculation, and an oxidation catalyst singly and in combination. Substantial reductions in all emissions were effected on both engines with a combination of exhaust gas recirculation, air injection, and an oxidant catalyst with some increase in fuel consumption and loss in maximum power. (Author abstract)

**28754** **APTIC NO. 50795**

Squires, Arthur M.

NEW SYSTEMS FOR CLEAN POWER. *Int. J. Sulfur Chem., Part B, 7(1):85-98, 1972. 30 refs.*

Pollution control for power generation plants using gas and steam turbines during complete combustion, partial combustion, and pyrolysis is examined with respect to gas turbine technology, dolomite kinetics, and comparative efficiencies, advantages, and costs of the three systems. The complete combustion alternative is characterized by fluidized-bed boiler operation at six atmospheres, using dolomite to absorb sulfur dioxide. The partial combustion alternative is a gravitating bed gasifier for operation at twenty atmospheres to yield a lean fuel gas of about 140 Btu/cu ft. Fuel gas from the coal gasifier is scrubbed with water to remove solids, alkali, and chlorine. An alkaline liquor could also be used to scrub hydrogen sulfide from the fuel gas. Pyrolysis is also examined. The development of the partial combustion technique is well-advanced, but gasification and pyrolysis have several advantages over complete combustion.

**28755** **APTIC NO. 50584**

Taichi, Tsuritani

PROBLEMS OF DUST COLLECTION IN PIGMENT FACTORIES AND THEIR COUNTERMEASURES. *(Ganryo kojo ni okeru shujin no mondaiten to sono taisaku). Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 10(3):32-38, Aug. 1972. 7 refs. Translated from Japanese, 22p.*

The general properties of pigment dusts were studied with respect to emission sources in pigment factories, the basic concepts of dust removal, and the comparative efficiencies of various dust collectors. Pigment dust characteristics and behavior were examined with respect to their movement in the atmosphere, i.e., scattering, suspension, diffusion, dispersion, and settling behavior; collision, adhesion, and filtration properties; wetting and adsorption behavior; energy actions; coloration pollution; and effects on the human organism. In workshops handling harmful substances, a 100% collection efficiency would be required. Complete removal of suspended dusts should be possible by the proper combination of bag filters with either cyclones or electric precipitators. Besides the operating variables and design considerations which affect collection efficiency, proper maintenance and inspection are also necessary.

**28756** **APTIC NO. 50741**

Takuma, Masuji and Fumio Ishii

ELECTROSTATIC PRECIPITATOR. *(Denki shujinki). Text in Japanese. (Sanyo Electric Co., Ltd., Moriguchi (Japan)) Japan. Pat. Sho 47-34958. 2p., Oct. 23, 1972. (Appl. Nov. 19, 1970).*

An electrostatic precipitator is described which is easier to clean. The ionization lines and discharge electrodes are upright in the main casing of the precipitator. The front cover of the main casing is detachable and can swing open downward. The lower ends of the front cover frams are connected to the front end of the bottom of the casing with hinges. The plate on the front cover is mounted onto these frames so it can be easily removed. The negative, dust-collecting electrodes are fixed to the front cover so that they can be positioned between two discharge electrodes and two ionization lines when the cover is closed. When the dust-collecting electrodes become covered with collected dust, the front cover swings downward and is removed. It is then easy to clean the dust-collecting plates, the ionization lines, and the discharge electrode plates with water.

**28757** **APTIC NO. 50918**

Tatsumoti, Yasuo and Shigetake Yoshimura

INTAKE/EXHAUST DEVICE OF AUTOMOBILE ENGINE. *(Jidosha enjin no kyuhaiki sochi). Text in Japanese. (Toyo Kogyo Co., Ltd., Hiroshima (Japan)) Japan. Pat. Sho 47-31726. 4p., Aug. 15, 1972. (Appl. Jan. 14, 1970, 1 claim).*

An intake/exhaust device to ensure complete combustion of fuels in internal combustion engines and therefore minimize engine exhausts was developed. The device is basically an air feed system designed to feed primary air into the inlet manifold to control the air-fuel ratio for complete combustion when the engine is at deceleration. Simultaneously, the check valve controlling the injection of secondary air into the reactor is closed to prevent the emission of unburned gases and the explosion of combustibles in the exhaust gas. Secondary air is fed into the exhaust gas at all normal driving modes, except for deceleration, when the engine is in the low revolution speed range. At high speed ranges, secondary air feed is automatically stopped. The design criteria and operation are examined.

**28758** **APTIC NO. 50919**

Tatsutomi, Yasuo and Shigetake Yoshimura

INTAKE/EXHAUST DEVICE OF ENGINE. *(Enjin no kyuhaiki sochi). Text in Japanese. (Toyo Kogyo Co., Ltd., Hiroshima (Japan)) Japan. Pat. Sho 47-31725. 4p., Aug. 15, 1972. (Appl. Jan. 14, 1970, 1 claim).*

An intake/exhaust device to ensure complete combustion in internal combustion engines and to minimize engine exhausts was developed. In a standard engine, the throttle valve of the carburetor closes for deceleration, thereby limiting air intake, but gasoline intake is not adequately limited due to high negative pressure. A thick air-fuel mixture results, and complete combustion is prevented, with the exhaust gas containing more combustibles and emitting greater amounts of carbon monoxide and hydrocarbons. The modified intake/exhaust system is equipped with an air feed device which operates according to the negative pressure in the intake manifold and feeds primary air only when the engine is decelerating to ensure an adequate air-fuel ratio. Secondary air is fed into the exhaust gas in the low-revolution range during normal driving cycles, except for deceleration, and stops when the engine revolution reaches the high-speed range.

**28759** **APTIC NO. 50880**

Tsuboi, Hiroshige

AUTOMATIC CLEANER OF LINT FILTER. *(Rinto firuta no jido seiso sochi). Text in Japanese. (Inoue Kogyo K. K., Tokyo (Japan)) Japan. Pat. Sho 47-42586. 3p., Oct. 27, 1972. (Appl. Oct. 15, 1970, 1 claim).*

In a spinning mill, air filters become clogged with lint, thus requiring frequent cleaning. This invention describes a better way of removing the lints. A suction nozzle is used to remove lint from the filter. The nozzle is connected to a suction fan with a flexible hose. The nozzle and two arms are moved up and down by a drive mechanism. When the filter is clogged, the suction fan is operated to suck lint through the suction nozzle, and the motor moves the suction nozzle up or down along the filter. Suction is 12 m/sec if the flow rate for normal flitering is 3 m/sec.

**28760** **APTIC NO. 50745**

Tsukiji, Yasuo

EXHAUST STACK. *(Haien sochi). Text in Japanese. (Mitsubishi Heavy Industries, Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-29629. 4p., Sept. 5, 1972. (Appl. July 15, 1968).*

A multi-stack chimney is described that permits the adjustment of the stack opening according to the quantity of smoke being discharged. Exhaust gases from several neighboring stacks are led through individual flues to a common stack through which they are discharged for more effective atmospheric diffusion. The stack has an assembly of flexible plates in each section of the discharge port to narrow the stack opening when the smoke discharge is less so that a flow speed sufficient for effective atmospheric diffusion can be maintained.

**28761** **APTIC NO. 50473**

Ukeguchi, Nobuhiro, Mutsuo Kuragasaki, and Mitsunori Sasaki

SMOKE DISCHARGE DEVICE. *(Haien sochi). Text in Japanese. (Mitsubishi Heavy Industries, Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-28897. 3p., Aug. 30, 1972. 2 refs. (Appl. Jan. 29, 1968).*

A flue gas discharge system is described in which two or more sources of flue gas are connected to the main stack by branch flues or ducts so that all the flue gas from all the emission sources is discharged through one stack. In conventional systems, flue gas often flows back to the emission sources because a blower is installed at the exit of each source, and the gas occasionally leaks out of the ducts. The new system eliminates these defects by using several blowers in the main flue between the stack and the emission source closest to the stack. A set of dampers are installed immediately before the blowers. A throttle valve damper is further inside between the dampers and source. Between the throttle valve damper and the group of dampers is a gas pressure detector connected to the control input. The input from the gas pressure detector is sent to the on-off and pole switches of the motors and to switches controlling blade angles of the blowers and opening and closing of the dampers. Thus, the number of blowers to be operated and adjustments to the control flow of the gas can be automatically determined according to the gas pressure.

**28762** **APTIC NO. 50699**

Uzawa, Kokichi

CHIMNEY WITH SMOKE-CLEANING DEVICE. *(Baien jokyo entotsu). Text in Japanese. (Assignee not given) Japan. Pat. Sho 47-35497. 3p., Sept. 6, 1972. 3 refs. (Appl. Sept. 21, 1968, 1 claim).*

A stack is described which has a scrubber using netting. Water membranes form in the mesh and arrest harmful substances contained in the stack gas. The scrubber consists of a cylindrical base with a cone-shaped top on which is a parabolic net structure. A basket-like structure of netting is placed between the cylindrical base and a cylinder with the top side concaved over an inverse cone. When temperature rises due to stack gas flowing upward, an electromagnetic valve opens, and water is discharged into the uppermost component of the scrubber. Water flows downward along the cone, the parabolic net structure, the basket-like structure, and the cylindrical base. Water membranes form in the mesh of the nettings; smoke is cleaned by the membranes and the water flowing downward. A heat exchange device allows the scrubbing water to be preheated. Used water is discharged.

**28763** **APTIC NO. 50501**

Watanabe, Kazumi, Hisao Igarashi, and Atsushi Takenouchi

VEHICULAR TYPE WET DUST REMOVER. *(Sharyoshiki shisshiki jojinki). Text in Japanese. (Japan National Railroad, Tokyo and Toyo Netsukogyo Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-25712. 2p., Aug. 10, 1972. 2 refs. (Appl. Dec. 23, 1967).*

A mobile wet dust collector used for cleaning railroad cars is described. An axial-flow fan is installed in the first scrubbing compartment and a water jet nozzle is below the fan/disc plate unit. In the second scrubbing compartment there are three filters and water spray nozzles on both sides of the first filter. Dusty air is then filtered by the second and third filters; the last filter also removes water drops not removed by the second filter.

**28764** **APTIC NO. 50442**

Watanabe, Teruo

ELECTRIC PRECIPITATOR ON ROOF TO PREVENT EMISSION DUST FROM SHOP HOUSING. *(Kenokujobu tosaigata denki shujin sochi). Text in Japanese. Funtai Kogaku Kenkyu Kaishi (J. Res. Assoc. Powder Technol., Japan), 418-421, Nov. 1972.*

Natural, sealed, and forced ventilation types of dust collectors can be used in buildings. A roof-top electrostatic precipitator which is a variation of the natural ventilation type features low cost and easy maintenance. The dust arrested by the electrode plates is washed with water; the water-dust slurry is then sent to a waste water disposal device. The design of the precipitator is discussed.

**28765** **APTIC NO. 50564**

Wiesener, Klaus

STUDY OF ANODIC OXIDATION OF SULFUR DIOXIDE ON POROUS COAL ELECTRODES IN ACID ELEKTROLYTES. *(Zur anodischen Oxydation von Schwefeldioxid an poroesen Kohleeletroden in sauren Elektrolyten). Text in German. Wiss. Z. Tech. Univ. Dresden, 21(3):513-518, 1972. 10 refs.*

The electrochemical oxidation of sulfur dioxide in sulfuric acid electrolyte was studied on porous coal electrodes with simultaneous production of electric energy in a galvanic cell. Aluminum-vanadium mixed oxides with traces of platinum were applied as catalysts to the electrodes. Both the manufacturing conditions as well as the ratio V2O5 to Al2O3 were decisive for the activity and stability of the catalyst in acid electrolytes. For the study of the mechanism of anodic oxidation of sulfur dioxide, potentiodynamic measurements were taken. In the presence of catalysts, SO2 was oxidized by two mechanism. At less positive potential a direct electron transfer from SO2 to the anode took place, while at more positive potential SO2 and the electrolytically formed surface oxides of the catalyst react with each other. In East Germany, 11.7 million tons of H2SO4 were produced in 1969, during which 8.92 times 10 to the 11th power heat energy was liberated. Through electrochemical production of H2SO4, electric energy could be theoretically produced. The described study was carried out to study whether an electrochemical H2SO4 production can be realized in practice.

**28766** **APTIC NO. 50506**

Yadera, Isamu and Toshio Shibahara

ELECTRIC PRECIPITATOR. *(Denki shujinki). Text in Japanese. (Matsushita Seiko K. K., Osaka (Japan)) Japan. Pat. Sho 47-26037. 2p., Aug. 11, 1972. (Appl. June 11, 1968)*

A new electrostatic precipitator is described which permits easy replacement of the negative electrode plates whenever they require cleaning to maintain efficiency. The positive electrode plates are suspended from a line stretched between the top ends of two supporter frames. An electroconductive cross bar is installed between the lower parts of the two frames. The cross bar is fitted to the frames with springy holders designed to permit easy replacement of the negative electrode plates.

**28767** **APTIC NO. 50441**

Yamashita, Kenichi

EFFICIENCY OF FILTER USING TEST DUST. *(Shikenyo dasuto o mochiita rozai no seinoshiken). Text in Japanese. Funtai Kogaku Kenkyu Kaishi (J. Res. Assoc. Powder Technol., Japan), 9(6):411-414, Nov. 1972.*

Test dusts to determine the efficiency of air filters according to the Japanese Industrial Standards were studied. Filter clogging varied according to the type of test dust. A dry-type filter paper clogged more quickly than a non-woven filter cloth with all types of test dusts except cotton lints. A dust containing carbon black accelerated clogging. Fly ash, talc, and Kanto loam also caused clogging. While a large amount of fly ash was arrested by filter materials, more was likely to pass through the filters. The fly ash particulates arrested by the filter formed a dust layer giving a high percentage of voids, through which the spherical fly ash particles could pass more easily. The effect of pressure loss was also studied.

**28768** **APTIC NO. 50499**

Yukidake, Tsugita

INSULATOR CHAMBER OF ELECTRIC PRECIPITATOR. *(Denki shujinki no gaikanshitsu). Text in Japanese. (Hitachi, Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-25093. 2p., Aug. 5, 1972. (Appl. Dec. 10, 1969)*

The discharge electrodes of an electric precipitator are held in place by a rod suspended from a ceramic insulator fixed above the casing of the precipitator. The lower part of the insulator is encased in the insulator box or chamber provided on the casing of the precipitator for the purpose of keeping the insulator clean. Clean air is usually fed into the chamber to keep the insulator clean. An insulator chamber is described which reduces the amount of necessary clean air and at the same time makes it possible to reduce the size of the insulator. A disc plate is mounted onto the rod suspended from the insulator while baffle or guide plates are fixed onto the inner wall of the chamber. As clean air is taken into the chamber through the inlet port provided on the upper part of the chamber wall, it flows downward and goes through the narrower space formed by the baffle or guide plates. Then it flows further downward between the disc plate and the inner wall of the chamber until it reaches inside of the casing. The gas ascending from the inside of the precipitator casing is blocked by the disc plate and the baffle plates, and is thus prevented from reaching the insulator.

## 1971

**28769** **APTIC NO. 50577**

Parsons, Terry B., Philip S. Lowell, Nancy B. Phillips, and T. I. Strange

A THEORETICAL STUDY OF NOX ABSORPTION USING AQUEOUS AND DRY SORBENTS. (FINAL REPORT). (VOLUME II). *Radian Corp., Austin, Tex., Office of Air Programs. Contract EHSD 71-5, APTD-1138, RAD-71-200-007-01, includes TN-200-007-02, TN-200-007-03a, TN-200-007-4a, TN-200-007-06, TN-200-007-09, TN-200-007-11, TN-200-007-12, TN-200-007-14, TN-200-007-15, and TN-200-007-16, 285p., Dec. 31, 1971. 746 refs.*

NTIS: PB 211058

Experimental studies on the aqueous absorption of nitrogen oxides and on absorption mechanisms are summarized. Equations describing the equilibria between nitric oxide, nitrogen dioxide, and water in the gas phase are given. The equations were developed for a computer program written to be compatible with an aqueous equilibrium formation describing equilibria in scrubber solutions. Selected values for equilibrium constants (vapor-liquid, ionic, and liquid-solid) used in the aqueous equilibrium formulation are given. The constants were calculated to extend a mathematical model of limestone wet scrubbing processes for sulfur dioxide removal to describe alkaline scrubbing processes for nitrogen oxides removal. Standard heats of formation, absolute entropies, heat capacity, and transition data are tabulated for 220 compounds including pure and hydrated nitrates, nitrites, nitrides, and hydroxides of 35 metals plus several nitrogen oxides. Published data on the high-temperature behavior of metal nitrates and nitrites are reviewed and discussed in terms of their implications for the use of thermal decomposition as a regeneration method in nitrogen oxides removal processes. Material balance calculations for NO and NO2 absorption in a packed tower are presented. A mechanism is proposed to explain mass transfer of NO and NO2 from flue gases into aqueous alkaline solutions; it is based on gas film limited transfer of nitrous acid and nitric acid. Mass transfer coefficients calculated on the basis of this mechanism are given. Also given are calculations of decomposition pressures over metal nitrates and nitrites, subroutines used with the gas-phase equilibrium model, and major sources for the acquisition of pertinent literature on the aqueous absorption of nitrogen oxides.

**28770** **APTIC NO. 50808**

Town, J. W., J. H. Russell, and H. J. Kelly

REMOVING SULFUR DIOXIDE FROM FLUE GASES: REGENERATION RATES FOR ALKALIZED ALUMINA. *Bureau of Mines, Albany, Oreg., Albany Metallurgy Research Center, RI 7478, 27p., 1971. 5 refs.*

The effects of reducing gas composition, temperature, and superficial gas velocity on the regeneration rates of alkalized alumina were studied. Regeneration was assumed to follow the simple first order reaction for removal of sorbed sulfur dioxide. An Arrhenius relationship shows an activation energy of about 75 kcal/mole for simulated reformed propane. The general effects of individual gases are described. Carbon monoxide and hydrogen produced rates proportional to their concentrations, up to 5% for each. Addition of carbon dioxide had no effects on the regeneration rate by CO. The regeneration rate by hydrogen was lowered by the addition of water while the regeneration rate by CO was increased by water addition. Hydrogen sulfide showed a positive effect up to 2% concentration levels and then produced a rapid negative effect. Carbonyl sulfate increased the sulfur content. (Author abstract modified)

### 1970

**28771** **APTIC NO. 50585**

Akimoto, Shinkichi

APPARATUS FOR MANUFACTURING MAGNESIUM SULFITE. *(Aryusan maguneshiumu no seizo sochi). (Assignee not given.) Japan. Pat., 1970. (Appl. Oct. 26, 1966, 1 claim). Translated from Japanese, 9p.*

A process for manufacturing magnesium sulfite based on the reaction of magnesium hydroxide with sulfur dioxide is presented. The process includes a sulfur dioxide absorption zone where magnesium hydroxide is reacted with SO2 and a crystal zone where the magnesium sulfite crystals are grown. The complete process and apparatus are examined. The process is effective for air pollution control, since SO2 in exhaust gases from furnaces and other combustion processes can be absorbed by a magnesium hydroxide slurry even in low concentrations (0.1-2% content). The process is sufficiently applicable to the manufacture of sulfuric acid.

**28772** **APTIC NO. 51000**

Gordon, G. M.

BASIC TRENDS IN RESEARCH BY GINTSVETMET IN THE FIELD OF GAS AND DUST SEPARATION. *Soviet J. Non-Ferrous Metals (English translation from Russian of: Tsvetn. Metal.), 11(5):9-10, May 1970.*

Research conducted by the Gintsvetmet Institute in the field of dust separation and collection is reviewed. The programs include the study of dust collection at non-ferrous metal plants, the cleaning of gaseous compounds such as sulfurous anhydride, methods of reducing dust entrainment from fluidized-bed furnaces by the application of an electrostatic field, and the use of polymer based ionites as sorbents for gases.

**28773** **APTIC NO. 50607**

Tada, Y., T. Sugiura, and H. Yasunobu

ON 50 PERCENT EUTETIC FERROSILICON AND REFINING IT IN CLOSED FURNACES. *(50 Kyosho fuereoshirikon to sono mitsuhei ro seiren ni tsuite). Feroaroi (Ferroalloy), 19(1):1-5, 1970. 3 refs. Translated from Japanese, 14p.*

A process for the closed furnace refining of ferrosilicon containing about 50% silicon is examined. The facilities, process design, structural requirements, and product quality are reviewed. The quantity of furnace gas generated is 1100 cu Nm/t, containing about 80% carbon monoxide and 10-20 mg/cu NM of dust, once cleaned. The gas is used by a chemical manufacturing plant as the raw material for ammonia and the synthesis of acrylic acid esters.

**28774** **APTIC NO. 50662**

Turner, James Harvey

FLUID BED ADSORPTION OF LOW CONCENTRATIONS OF SULFUR DIOXIDE IN AIR ONTO ACTIVATED CARBON. *Clemson Univ., S. C., Chemical Engineering Dept., Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., May 1970, 233p. 78 refs.*

An exploratory investigation was made of sulfur dioxide in partially dried air-activated carbon. Unsteady state, single stage, fluid bed adsorption was studied to find the effects on mass transfer of changes in temperature, concentration, velocity, and bed height. The ranges used were: 96-180 F (bed inlet temperature), 0.1 0.3% SO2 (inlet concentration), 0.767 - 1.918 ft/sec (superficial velocity), and 2.24 6.72 in. (bed height). The carbon was Nuchar WV-W screened to 16/30 U. S. mesh with bulk density of averaged 16/cu ft 34.9 and surface area of 710 sq m/g. Inlet air humidity averaged 160 ppm, but varied from 33 to 450 ppm. The practical capacity of the carbon was dependent on temperature, concentration, bed height, pressure, velocity, moisture content, and contacting scheme. With variation in only temperature and concentration, the Langmuir equation described the steady state adsorption value. Mass transfer rate increased with velocity or concentration, decreased with larger bed heights, and was unaffected by temperature changes. The greatest rate was at the lowest bed height and greatest velocity. Pore diffusion was not limiting below 1.34 ft/sec superficial velocity at 135 F bed inlet temperature. A direct measure of rate, as defined in the investigation, correlated well with the data, better than the mass transfer coefficient or transfer unit height. Fixed and fluid beds performed equally well on a time-to-saturation basis at 0.2% sulfur dioxide inlet concentration, but the fixed bed was saturated more rapidly at other concentrations. Regression analysis was employed to provide prediction equations for the various measures of mass transfer. (Author abstract modified)

### 1963

**28775** **APTIC NO. 50619**

Shkrabo, M. L. and I. M. Ryabenko

A METHOD FOR OBTAINING A CHEMICAL ABSORBER OF HARMFUL GASES. *(Sposob polucheniya khimicheskogo poglotitelya vrednykh gazov) (Assignee not given.) USSR Pat. 156936. 1963. (2 claims). Translated from Russian, 2p.*

The process for manufacturing a chemical absorber for harmful gases is presented. The disadvantage of previous absorbers, i.e., the relatively low dynamic activity of the known absorbers in short layers, was overcome by adding 15-20% of zinc oxide to the mixture of 75-80% of manganese dioxide and 3-5% of cuprous oxide. The absorber obtained after mixing, drying, pressing, and grinding was more active than chemical sorbents by a factor of 4-5 for sulfur dioxide, 2-3 for hydrogen sulfide, and approximately 3 for nitrogen oxides.

## MEASUREMENT METHODS

### 1973

**28776** **APTIC NO. 50859**

VDI (Verein Deutschen Ingenieure), Duesseldorf (West Germany), Kommission Reinhaltung der Luft

GASEOUS EMISSION MEASUREMENT. INFRARED SPECTROMETRIC DETERMINATION OF ORGANIC COMPOUNDS. FUNDAMENTALS. *(Messung gasfoermiger Emissionen. Infrarotspektrometrische Bestimmung organischer Verbindung. (Grundlagen). Text in German. VDI (Ver. Deut. Ingr.) Richlinien, 9(2460):1-4, March 1973. 24 refs.*

Infrared spectroscopy can be used for the analysis of organic compounds (gases, vapors, and aerosols) in waste gases. The method is based on the measurement of the spectral radiation absorption of substances or substance mixtures in the infrared range of the electromagnetic spectrum. A monochromator is used for spectral analysis of the radiation penetrating the air sample. The recording two-beam infrared spectrophotometer with optical zero adjustment is the most used spectrophotometer. Sampling, preparation of comparative concentrations, and the measuring process are discussed.

**28777** **APTIC NO. 50551**

Arimitsu, Satoshi, Yasuharu Ijuuin, and Hiromichi Uehara

DETERMINATION OF LOW CONCENTRATIONS OF ATMOSPHERIC NITROGEN DIOXIDE USING CONCENTRATION TECHNIQUE. *(Noshukuho ni yoru osentaikichu teinoodo NO2 no kenshutsu ni okeru teiryosei no kento). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 681, 1973. 1 ref. (Presented at the Japan Chemical Society, Spring Meeting, 28th, Tokyo, Japan, April 1-5, 1973, Paper 2D39.)*

Nitric oxide and nitrogen dioxide can be determined with a gas phase electron paramagnetic resonance (EPR) method. Nitrogen dioxide was determined with a 10 ml sample when the concentration was above 15 ppm. The analysis at lower concentrations was performed using a low temperature concentration technique. The enrichment ratio was known to be 330 from the volume ratio measurement. Thus, the detection limit decreased to 0.05 ppm. The EPR signal intensity was proportional to the NO2 concentration even below 1 ppm. This suggests that the concentration technique is effective and successful. The technique was also applied to spectrophotometric determination of NO2. Nitrogen dioxide had an absorption maximum at 413.5 nm, and the optical density was proportional to NO2 concentration below 30 ppm. The detection limit was 0.3 ppm in this case.

**28778** **APTIC NO. 50654**

Bascom, R. C., J. W. Bozek, C. C. Everett, T. S. Kinnunen, and T. O. Wagner

EVALUATION OF RESEARCH TECHNIQUES FOR EVALUATING FULL-FLOW LIGHT EXTINCTION SMOKEMETERS. *Coordinating Research Council, Inc., New York, Air Pollution Research Advisory Committee, Proj. CRC-APRAC CAPI-1-64-7, Rept. 453, 44p., Jan. 1973.*

A research technique for assessing the performance of full-flow, light-extinction type smokemeters is described in detail. This technique provides a useful guide to quantify the various performance characteristics of a smokemeter, including calibration, instrument drift, input voltage sensitivity, temperature sensitivity, response time, sensitivity to ambient light, and shock and vibration resistance. Test data and observations for complete or partial evaluation of six smokemeters, using the above technique, are presented.

**28779** **APTIC NO. 50723**

Berner, Axel

A SIMPLE METHOD FOR CORRECTION OF THE FREQUENCY DISTRIBUTION MEASURED WITH A MULTI-STAGE IMPACTOR. *(Ein einfaches Verfahren zur Korrektur von Haeufigkeitsverteilungen, die mit einem Vielstufenimpaktor gemessen wurden). Text in German. Staub, Reinhaltung Luft, 33(4):185-188, April 1973. 3 refs.*

The size distribution functions can be measured by a cascade impactor. The measured distributions are not identical with the dust distribution to be determined. For this reason a method based on the Junge distribution has been developed for reducing the measured distributions to the original ones. In a first correcting step the distribution concentration versus particle size from the measuring points of the impactor is plotted on log-log paper. Tangents and chords are drawn through the measuring points. Their slopes provide the parameters of Junge distributions. Various moments of the true distribution can be derived. The method applied to normal distributions of particles yields small but significant corrections if the standard deviation is less than 0.25 times the particle size levels in the impactor. The corrections are negligible for five times larger standard deviations.

**28780** **APTIC NO. 50974**

Breitenbach, L. P. and M. Shelef

DEVELOPMENT OF A METHOD FOR THE ANALYSIS OF NO2 AND NH3 BY NO- MEASURING INSTRUMENTS. *J. Air Pollution Control Assoc., 23(2):128-131, Feb. 1973. 8 refs.*

The development of methods for analyzing nitrogen dioxide and ammonia by nitric oxide-measuring instruments is described. Two instruments, the NO optical detector (NOOD) and the non-dispersive infrared analyzer (NDIR), their designs, operating variables, and efficiency are reviewed. The use of a system of two converters in conjunction with either of these instruments permits the analysis of a gas stream for NO, NO2, and NH3. Nitric oxide is measured on the gas stream before conversion; Nitrogen dioxide is determined after the gas stream has passed over a carbon-metal converter at 475 deg C; and ammonia is determined after the gas has been conducted over a carbon-copper converter. Temperatures for all conversions are given as well as converter configurations. Preliminary data indicated a lifetime of 2 months of continuous operation in conjunction with the NOOD instrument before the need for the replacement of the carbon-metal elements. (Author abstract modified)

**28781** **APTIC NO. 50719**

Breuer, Hans, Josef Gebhart, Klaus Robock, and Ulrich Teichert

PHOTOELECTRIC MEASURING UNIT FOR DETERMINATION OF THE FINE DUST CONCENTRATION. *(Fotoelektrisches Messgeraet zur Bestimmung der Feinstaubkonzentration). Text In German. Staub, Reinhaltung Luft, 33(4):182-185, April 1973. 7 refs.*

A dust photometer working according to the scattered light principle measures a value proportional to the volume of the respirable dust retainable or depositable in the alveoli of the lungs. This is reached by taking a mean scatter angle of 70 in connection with monochromatic primary light of a wavelength of 0.94 micron. Due to modulation of this primary light, and a selective tuning of the amplifier in connection with a phase sensitive rectifier, ambient light has no effect during the measurement, and a lower limit of measuring concentrations of less than 0.1 mg/cu m can be reached. The values measured are indicated either in a digital or analogous way and are linear for more than three powers. Results of measurement with monodisperse aerosols as well as with respirable coal and shale dusts are given. The dust photometer can be used as a hand sampler indicating the measured results instantaneously and as a continuously recording stationary measuring device.

**28782** **APTIC NO. 50804**

Campbell, Evan E., Gerry O. Wood, Patricio E. Trujillo, and Patricia Stein

EVALUATION OF METHODS FOR DETERMINING MERCURY. *Los Alamos Scientific Lab., N. Mex., Bio-Analytical Chemical Section, Atomic Energy Commission Contract W-7405-ENG-36, National Inst. for Occupational Safety and Health Proj. R-060, Rept. UC-41, LA-5188-PR, 8p., Feb. 1973. 10 refs.*

NTIS: LA-5188-PR

Four tentative methods for the determination of mercury in air, urine, blood, and tissue were evaluated. The method for determination of atmospheric samples was subjected to interlaboratory comparison studies using tubes containing charcoal analyzed by the tantalum boat method and tubes containing silvered Chromosorb P analyzed by thermal desorption preceding flameless atomic absorption. Investigations of the urine process included measurements of effects of storage time, shipping containers, and preservatives on retention of dissolved mercury in water and urine. Tentative methods were reviewed for analysis in tissue and blood.

**28783** **APTIC NO. 50831**

Campbell, Evan E., Gerry O. Wood, and Robert G. Anderson

DEVELOPMENT OF AIR SAMPLING TECHNIQUES. QUARTERLY REPORT. SEPTEMBER 16 THROUGH DECEMBER 31, 1972. *Los Alamos Scientific Lab., N. Mex., Bio-Analytical and Chemical Section, National Inst. for Occupational Safety and Health Proj. R-059, LA-5164-PR, 7p., Jan. 1973.*

A tentative method for sampling and analyzing aniline in air was developed. Aniline is adsorbed on silica gel, eluted with ethanol, and analyzed by gas chromatography. Retention and breakthrough measurements were made for the sampling tube chosen. Ethanol elution of aniline is essentially complete in minutes for freshly taken samples, but older samples must be eluted for at least an hour for complete desorption. The ethanol solvent acts as an internal standard for the gas chromatography analysis with a flame ionization detector. The sensitivity and precision of the analytical method was determined. Interferences for aniline adsorption were examined. The aniline method is being extended to include a large number of aromatic amine compounds. The alumina sampling tube for formaldehyde determination was redesigned to have a lower pressure drop which can be accommodated by personal sampling pumps. The gas chromatograph column previously used was changed, and a flame ionization detector was added. This improved specificity, sensitivity, and precision of the thermal desorption technique. The sampling and analysis method for formaldehyde is being tested for possible use in the determination of acrolein and other aldehydes. (Author abstract modified)

**28784** **APTIC NO. 50709**

Chiba, Atsushi

MICRODETERMINATION OF IRON IN ATMOSPHERIC PARTICULATES BY A PORTABLE GLASS RING OVEN, PART II. *(Keitaiyo garasusei ringu obun ni toru taikichu fuyu ryushijo busshitsu-chu no tetsu no teiryo). Text in Japanese.* ***Bunseki Kagaku*** *(Japan Analyst) (Tokyo), 22(1):21-25, Jan. 1973. 6 refs.*

A cylindrical shaped and portable glass ring oven is described for microdetermination of iron in atmospheric particulates. The apparatus is made of hard glass with external diameter of 55 mm and height of 100 mm. A 1:1 solution of bathophenanthroline and hydroquinone is used as detection agent. Collection of samples was prepared by using a membrane filter, cellulose filter, and glass fiber filter. The sample volume of air contained 0.05 to 0.5 micrograms of iron. The results were satisfactory with membrane and cellulose filters. The running time for all procedures was about 20 to 30 min.

**28785** **APTIC NO. 50521**

Ciuhandu, G. and A. Chicu

IMPROVED METHOD FOR THE DETERMINATION OF TRACES OF CO AMOUNTS IN HYDROGEN. *(Verbesserte Methode zur Bestimmung von CO-Spuren in Wasserstoff). Text in German. Z. Anal. Chem., 263(4):331-333, March 1973. 6 refs.*

Improved photometric method for the determination of carbon monoxide traces in hydrogen is described. The hydrogen stream containing traces of CO is led through a solution of alkaline silver-sodium-sulfamide benzoate at room temperature, after which photometric determination is performed at a wavelength of 420 nanom. With pressure and temperature given, the light absorption of the resulting silver salt is linear function of both CO concentration and passage duration. The difference between the rates of reduction by CO and H2 is in the order of 10,000. Gas passage over 30 min is sufficient for the detection of a minimum CO concentration of 0.001%.

**28786** **APTIC NO. 50637**

Culkowski, Walter M. and Searle D. Swisher

LIDAR VS. PHOTOMETER, A ONE MONTH COMPARISON. *National Oceanic and Atmospheric Administration, Oak Ridge, Tenn., Environmental Research Labs., ATDL 76, 10p., Jan. 1973.*

Results are presented for the month of Sept. 1972 of a comparison between turbidity data (photometer) and lidar backscattering data. Correlations of 0.99 were obtained for one set of data, but on a semi-logarithmic rather than linear basis. Comparisons with a distant particulate sensing station are also presented. (Author abstract)

**28787** **APTIC NO. 51015**

Dagnall, R. M., D. J. Johnson, and T. S. West

A METHOD FOR THE DETERMINATION OF CARBON MONOXIDE, CARBON DIOXIDE, NITROUS OXIDE AND SULPHUR DIOXIDE IN AIR BY GAS CHROMATOGRAPHY USING AN EMISSIVE HELIUM PLASMA DETECTOR. *Spectrosc. Lett., 6(2):87-95, 1973. 13 refs.*

Two methods using molecular sieves and the emission from a microwave excited plasma have been combined to provide a rapid, sensitive, and selective method for the measurement of the named gases in the air. Helium was chosen as the carrier gas because it gives a simple emission spectrum, consisting mainly of helium atomic lines, and hence no problems are encountered with the plasma background. Its high ionization also facilitates the fragmentation of molecular species, enabling gases to be monitored at appropriate atomic lines. The emission spectra of the gases in helium are recorded using the scanning facilities of the spectrometer. Nitrous oxide was monitored by measurement of the emission at the 337.1 nm band head, sulfur dioxide at the 190.0 nm sulfur atomic line, and carbon monoxide and carbon dioxide at the 247.9 nm carbon atomic line.

**28788** **APTIC NO. 50424**

Dobreva, M., K. Galabova, L. Toscheva, and St. Ivanova

FINE DUST MEASUREMENTS AT THE WORKING PLACE WITH THE AID OF A MICROCYCLONE. *(Feinstaubmessung am Arbeitsplatz mit Hilfe von Mikrozyklon). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 19(2):98-102, 1973. 7 refs.*

Fine dust measurements were taken at various dust producing processes in mines, foundries, and glass manufacturing plants. A microcyclone designed for a throughput of 40 l/min was used. Two samples were taken at one time, one for determination of the fine dust concentration and the other for determination of the total dust concentration. A total of 423 sample pairs were taken. The sampling time lasted from 1.5 to 5 hr. The fine dust concentration measured in the samples ranged from 5-32%. The average concentration of respirable dust varied between 0.2 and 3.5 mg/cu m. The microcyclone proved to be suitable for routine measurements. It produced satisfactory reproducible results. In Bulgaria the microcyclone is the official standard unit for the measurement of non-toxic dusts.

**28789** **APTIC NO. 50842**

Dorsey James A. and William B. Kuykendal

MONITORING SYSTEMS FOR PARTICULATE CONTROL EQUIPMENT EVALUATIONS. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Control Systems Lab. Air Pollution Control Assoc., Pittsburgh, Pa., 18p., March 1973. 2 refs. (Presented at the Air Pollution Control Association, Specialty Conference on Particulate Control, St. Louis, Mo., 1973.)*

Monitoring systems for particulate control equipment evaluations are discussed. Three areas of concern in the application of monitoring systems are: the analysis of the sample, the transport system required to convey the sample to the analyzer, and the techniques necessary to ensure adequate representation of the total gas flow. A general review of the present capabilities and the problems that exist in each area are presented. For analyzers, several sensing principles are discussed which are useful in making the required measurement of mass. Instruments for on-line analysis of size distributions have not been developed as tools for control device evaluations, and several potential approaches are suggested. All of the techniques presently available require extraction of a sample from the main gas stream. This presents problems in particulate transport through the probing systems and traversing of the duct to establish particulate concentration and/or velocity. The measurement of opacity is mentioned. The applicability of the available technology to a wide range of process conditions has not been evaluated, and a considerable effort is required to determine the accuracy and reliability of complete systems installed on full scale control equipment. (Author abstract modified)

**28790** **APTIC NO. 50996**

Futsuhara, Natsuko, Kazue Masuda, and Naoomi Yamaki

THE EFFECT OF OXIDES OF NITROGEN ON THE MEASUREMENT OF PHOTOCHEMICAL OXIDANTS. *(Okishidanto sokutei ni oyobosu chisso sankabutsu no eikyo). Text in Japanese. Kogai (Hakua Shobo) (Pollution Control), 8(2):58-66, March 1973. 3 refs.*

The effect of nitrogen dioxide and nitric oxide on the measurement of oxidants by the neutral buffered potassium iodide method is investigated. Five types of oxidant analyzers and three types of oxidizers filled with filter paper, which was impregnated with chromium trioxide-sulfuric acid to remove sulfur dioxide, were studied. The extent of the effect of NO2 for each of the analyzers was different depending on the analyzer. The concentration of potassium iodide solution was varied within 1-10%. The rate of passing NO2 and the rate of eluting NO to NO2 were affected by the moisture content of the chromium trioxide paper and decreased as the moisture content decreased.

**28791** **APTIC NO. 50511**

Galtieri, A. and G. Rezzonico

ANALYSIS OF UNBURNED MATTER IN CONTAMINATED ATMOSPHERES. *(Controllo degli incombusti in atmosfere viziate). Text in Italian. Riv. Combust. (Milan), 27(1):29-32, Jan. 1973.*

Test techniques used by the Experimental Station for Fuels in Milan for the evaluation of the performance of special burners (catalytic heaters and burners for greenhouses) operating on consumer gas, natural gas, and liquefied petroleum gas are described. Some types of heaters (catalytic space heaters) are tested in hermetically sealed cabins equipped with an inspection window and a door guaranteeing an airtight seal. Inside is a fan for complete mixing of the ambient air in the cabin. The cabin can be cooled from the outside for the maintenance of a stable temperature of 40 C. Air samples are drawn from the geometrical center of the cabin by means of two glass pipettes. In the case of catalytic panel heaters using liquefied butane under a pressure of 28 or 30 mbar, unburned matter and carbon monoxide in the combustion gas are measured with the sample taken when carbon dioxide in the atmosphere of the cabin reaches 1%. Carbon monoxide is determined when the CO2 level reaches 2.4%. Fluctuations of the concentration of CO2 are recorded continuously by the infrared analyzer LIRA 300. Analogous tests are performed with greenhouse heaters. A Hewlett Packard gas chromatograph with an integrator for the automatic recording of peaks and time of emergence from the chromatographic column is used. The peaks on the chromatogram denote from right to left ethane, ethylene, propane, propylene, isobutane, and n-butane. The degree of reduction of atmospheric oxygen can likewise be determined by means of the sealed cabin.

**28792** **APTIC NO. 50939**

Georgii, H. -W. and L. Grosch

A CONTRIBUTION TO THE MEASUREMENT OF ATMOSPHERIC FREEZING NUCLEI. *(Ein Beitrag zur Messung atmosphaerischer Gefrierkerne). Text in German. Meteorol. Rdsch., 26(2):45-48, 1973. 13 refs.*

An analysis of the membrane filter method for determination of atmospheric freezing nuclei is given, and some improvements in the method are discussed. The cooling chamber was improved in which the temperatures were not sufficiently constant. The outer wall was better insulated, a dry lock was installed, and all work in connection with the cooling chamber was performed on a dry workbench. Through these changes the temperature fluctuations could be reduced to 0.02 C. The influence of the volume effect on the ice particle concentration was studied. At constant temperature of minus 18 C the freezing nuclei concentration at relative humidities between 98 and 106% was studied. Each time three collectives of eight simultaneously exposed filters were analyzed. Above the point of water saturation a linear increase of the number of freezing nuclei was observed. At various locations with differing aerosol compositions and differing fractions of anthropogenic aerosols, the spatial distribution of freezing nuclei was measured in 1971. A marked decrease was found of the absolute concentration from continental to maritime stations. A higher concentration was found in the nonpolluted air on the Feldberg in the Taunus mountains. The absolute values are for a freezing nuclei concentration at minus 18 C and 1% oversaturation.

**28793** **APTIC NO. 50922**

Giever, Paul M.

ALL ABOUT TAPE SAMPLERS. *Pollut. Eng., 5(2):38-40, Feb. 1973.*

Automated filter tape air samplers are sensitive, timer-controlled, portable instruments that operate with a very high degree of repeatability. They can sample or monitor all types of particulate matter and certain gaseous pollutants in ambient air. Designed to collect cyclical samples of polluted atmosphere, and to operate unattended for extended time intervals, these tape instruments perform widely varied indoor and outdoor air sampling applications. When used outdoors, the instruments should be suitably enclosed for weather protection and to discourage tampering. Tape instruments have been adapted to sample hydrogen sulfide and fluoride gases in the parts per billion range. Tape instruments have visually demonstrated the performance of a dust collecting system by taking simultaneous air samples on both sides of the collector unit. Particle samples collected on tapes may be evaluated by two different techniques. One uses light transmitted through the sample spot, and the other uses light reflected from the spot. In both techniques, the degree of soiling by particulate matter is determined by comparing the light reading of a sample spot (from 0 to 100% light transmission or reflectance) with a reading of 100% transmission or reflectance taken from the clean tape sections adjacent to the sample spot. Tape instruments are not suitable for air evaluations based on volumetric or mass measurements, such as the measurement of a certain weight of particulate matter in a specific volume of air.

**28794** **APTIC NO. 50931**

Hamaguchi, Hiroshi

RELIABILITY OF CHEMICAL ANALYSIS. *(Kagaku bunsekiho no shinraido ni tsuite). Text in Japanese. Preprint, Japan Society of Analytical Chemistry, Tokyo, 6p., 1973. (Presented at the Japan Society of Analytical Chemistry, Symposium on Pollution and Analytical Chemistry, 7th, Tokyo, Japan, March 16, 1973, Paper 2.)*

The preparation of a standard sample for trace components is necessary to make a chemical analysis reliable. A chemical analysis of trace components in natural water was studied with copper and zinc as the trace metals. A standard sample was compared with a water sample from the Waterase River. Standard samples are also important for chemical analyses of pollutants in air.

**28795** **APTIC NO. 50910**

Hayashi, Hisato

DETERMINATION OF ASBESTOS DUST IN A WORK ENVIRONMENT BY THE X-RAY DIFFRACTION METHOD. *(Ekkususen kaisekiho ni yoru rodo kankyochu no asubesuto funjin no teiryoho). Text in Japanese. Preprint, Japan Society of Industrial Health, p. 144-145, 1973. (Presented at the Japan Society of Industrial Hygiene, Annual Meeting, 46th, Osaka, Japan, April 6-8, 1973, Paper 288.)*

To determine the composition of floating dust in a work area, dust is collected on a glass fiber filter of an air sampler and examined by X-ray analysis. Dust from an asbestos spinning operation is mainly asbestos, talc, brucite, ilmenite, and magnetite. The intensity of the X-ray diffraction line determines the mineral composition.

**28796** **APTIC NO. 50841**

Hodgeson, J. A., W. A. McClenny, and R. K. Stevens

APPLICATION OF CHEMILUMINESCENCE TO THE MEASUREMENT OF GASEOUS POLLUTANTS. *Preprint, 8p., 1973. 16 refs. (Presented at the American Chemical Society Meeting, Symposium on Analytical Methods Applied to Air Pollution Measurements, Dallas, Tex., April 8-13, 1973.)*

The application of chemiluminescent methods to the measurement of gaseous pollutants is discussed. Two types of chemiluminescence detectors have been applied to air pollution measurements. The ambient temperature detector employs the chemiluminescent reaction between the molecule of interest, in air, and a second reactive species. Another type of detector is one in which molecular, chemiluminescence emissions are observed in a cool flame. The first type of detector is used for the specific measurement of a single pollutant, while the flame detector is more applicable to the detection of classes of compounds. Common characteristics of the emission detectors include an inherent degree of sensitivity, specificity, and simplicity. Quantitative measurements down to 1 ppb of pollutant in air are feasible. The use of optical filters also enhances specificity. The detectors usually consist of gas inlet, reaction zone, air pump, optical filter, photomultiplier tube, and associated electronics. The applicability of the general method is limited to that class of molecules which enter directly, or indirectly, into chemiluminescent reactions. Another general limitation is the non-absolute nature of the measurement. Chemiluminescent detectors are normally calibrated with known concentrations of gas samples. Recent research, development, and application in the area of chemiluminescence analysis for ozone, nitrogen oxides, and sulfur compounds including sulfur dioxide are summarized.

**28797** **APTIC NO. 50678**

Honma, Katsunori

THE CLASSIFICATION CHARACTERISTICS OF THE PARTICLE DISTRIBUTION MEASUREMENT APPARATUS: ANDERSEN SAMPLER. *(Ryudo bunpu sokuteiki Andersen sampler no bunkyu tokusei). Text in Japanese. Preprint, Japan Society of Industrial Hygiene, p. 140, 1973. (Presented at the Japan Society of Industrial Hygiene, Annual Meeting, 46th, April 1973, Paper 226.)*

Using a standard aerosol and an Andersen sampler, the effectiveness of particle distribution measurement apparatus was examined. A high frequency heat aerosol producer was used for producing metal lead fume, and the aerosol was diluted through a dilution apparatus and supplied to the Andersen Sampler at the standard flow speed of 28.3 l/min. The measurements were taken by direct weight method and compared with the results of electron microscopic calculation methods. The particle distribution pattern resembled logarithmic regular distribution closely. The particles larger than submicron showed particularly good agreement.

**28798** **APTIC NO. 50872**

Ingram, William T. and Jack Golden

SMOKE CURVE CALIBRATION. *J. Air Pollution Control Assoc., 23(2):110-115, Feb. 1973. 5 refs.*

The objectives of this project were to establish the shape of a smoke curve for fine suspended particulates in New York City comparable to the international smoke curve used in British and European practice, and to relate two commonly used reporting units of surface concentration to each other. Micrograms/cu m (European practice) and coefficient of haze/1000 lineal ft (U. S. practice). The relationship between particulate density readings taken for 1-hour and 2-hour sampling periods was studied. Under the conditions stated it is now possible to take U. S. reporting units and convert them directly to European units. (Author abstract modified)

**28799** **APTIC NO. 50917**

Ishiguro, T., K. Iwasaki, Y. Fukushima, and K. Koyama

ODOR EVALUATION BY FIELD SURVEY. *(Fiirudo chosa ni yoru akushu no hyoka). Text in Japanese. Akushu no Kenkyu (Odor Research J. Japan), 2(9):23-50, Jan. 1973.*

Odor evaluation field survey methods are reviewed. Field studies were performed near chemical plants, fish processing plants, and animal bone processing plants using subjects selected on the basis of olfactory sense tests. The criteria used for chosing the subjects, qualifications, and training are reviewed. Sampling during field surveys should be by polyethylene phthalate or polypropylene bags, especially when there are several sources of odors. The survey methodology and some of the results are examined.

**28800** **APTIC NO. 50906**

Itaya, Muneaki and Hirozo Arimoto

SELECTIVE DETECTION OF NITROGEN COMPOUNDS BY MEANS OF A FLAME THERMOIONIZATION DETECTOR. *(Furemu netsu ion kenshutsuki niyoru chisso kagobutsu no sentakuteki kenshutsu). Text in Japanese. Preprint, Japan Chemical Society of Japan, Tokyo, p. 906, 1973. (Presented at the Japan Chemical Society, Spring Meeting, 28th, Tokyo, Japan, April 1-5, 1973, Paper 2F32.)*

Selective detection of nitrogen compounds with a flame thermoionization detector using rubidium salts as the thermoionic emission source is discussed. The selectivity of pyridine to hydrocarbons was 3700 to 1. The detection limit was 1 times 10 to the -12 power g/sec for pyridine and 1 times 10 to the -13 power g/sec for parathion. The dynamic range for nitrogen was slightly narrow (about 10,000) and the optimum hydrogen flow rate was rather low (about 40-50% of the nitrogen flow rate) compared to the flame ionization detector. This flame thermoionization detector does not require a long aging time (only 0.5-1 hr) and has a sufficiently long lifetime of more than 300 hr. The detector can also be applied to analysis of trimethylamine and nitrosoamines present in fish and to residues of carbamate pesticides.

**28801** **APTIC NO. 50774**

Kimura, Kikuji

PORTABLE SAMPLER FOR DUST. *(Funjin-yo kojin sampula ni tsuite). Text in Japanese. Preprint, Japan Society of Industrial Hygiene, p. 136-137, 1973. (Presented at the Japan Society of Industrial Hygiene, Annual Meeting, 46th, Osaka, Japan, April 6-8, 1973, Paper 224.)*

A portable dust sampler for measuring dust concentrations was tested in two versions: Type Two with constant volume equipment for the suction pump and having a smaller diameter and thus smaller (10 mm) suction pressure; and Type Three, a diaphragm-type suction pump with 250 mm in a mercury column suction pressure. The suction speed can be regulated to 1 l/min by a flowmeter. During a dust collection test, Type Two collected 45.1 to 46.7 mg/cu m and a Type Three type collected 43.4 to 44.9 mg/cu m.

**28802** **APTIC NO. 50722**

Klimisch, H. -J.

CLEAN-UP AND SEPARATION METHODS FOR THE ANALYSIS OF POLYCYCLIC AROMATIC HYDROCARBONS. FRACTIONATION OF CIGARETTE SMOKE CONDENSATE. *(Anreicherungs- und Trennverfahren zur Analyse polycyclischer aromatischer Kohlenwasserstoffe. Fraktionierung von Zigarettenracuhkondensat). Text in German. Z. Anal. Chem., 264(4):275-278, 1973. 6 refs. (Presented at the Tagung Euroanalysis I, Heidelberg, West Germany, Aug. 28-Sept. 1, 1972.)*

Two concentration methods for polycyclic aromatic hydrocarbons (PAH) from complex mixtures such as cigarette smoke condensate are described. Lipophilic compounds were completely separated from hydrophilic compounds by a gel distribution chromatographic column, for instance Sephadex LH-20, 85% methanol/n-hexane. Paraffinic substances were then separated from the obtained PAH concentrate of cigarette smoke condensate on a Sephadex LH-20/isopropanol column. Paraffins eluted from the column on the principle of gel chromatography, PAH eluted on the contrary with increasing ring size. Separation methods with high pressure liquid chromatography in polyamide or cellulose acetate columns are suitable.

**28803** **APTIC NO. 50925**

Matsuoka, Shingo and Takaaki Tamura

THE EFFECT OF THE HYDROGEN FLOW RATE ON THE RELATIVE MOLAR RESPONSES OF GASEOUS HYDROCARBONS IN A HYDROGEN FLAME IONIZATION DETECTOR. *(Suisoen ionka kenshutsuki no gasujo tankasuiso ni taisuru sotaicki moru kandochi ni suiso ryuryo izonsei ni tsuite). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 905, 1973. 2 refs. (Presented at the Japan Chemical Society, Spring Meeting, 28th, Tokyo, Japan, April 1-5, 1973, Paper 2F31.)*

The effects of experimental conditions on the sensitivity of hydrogen flame ionization detectors for analyses of hydrocarbons are discussed. At a H2 flow rate where the peak ion current of n-butane reaches a maximum, the relative molar responses obtained for an equimolar mixture of methane, ethane, ethylene, acetylene, propane, and propylene and for the same mixture diluted to 1/4000 agreed with reported results. At a low H2 flow rate, the relative molar responses deviated from reported values. In the equimolar mixture, the relative molar responses of methane, ethane, and propane were larger than the reported values and increased with decreasing H2 flow rate; in the 1/4000 diluted mixture, the reverse effect was observed. In the range of high H2 flow rate, such unusual behavior was also observed. The linearity of the relative molar response should not be expected at both low and high flow rate. A similar unusual behavior was observed at the low H2 flow rate in the case of the packed column measured at the N2 flow rate of 45 ml/min.

**28804** **APTIC NO. 50848**

Matsushita, Hidetsuru, Keiichi Arashidani, and Michiko Koyano

SIMPLE ANALYSIS OF POLYCYCLIC AROMATIC HYDROCARBONS IN POLLUTED AIRBORNE PARTICLES. *(Taiki osen fuyufunjin chu no takanhokozoku tankasuiso no kani bunsekiho). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 676, 1973. (Presented at the Japan Chemical Society, Spring Meeting, 28th, Tokyo, Japan, April 1-5, 1973.)*

A simple method for the determination of polycyclic aromatic hydrocarbons in airborne dust was developed using a combination of thin-layer chromatography and fluorescence photometry. The dust samples were collected by high-volume samplers and were then analyzed for contents of benzo(a)pyrene, coronene, anthracene, benzo(k)fluoranthene, benzo(a)anthracene, perylene, fluoranthene, and benzo(ghi)perylene. The experimental equipment and techniques, sample preparation, and analytical procedure are reviewed.

**28805** **APTIC NO. 50453**

Meyer, J. P., H. H. Oelert, and J. Zajontz

MEASUREMENT AND EVALUATION OF DIESEL-POWERED AUTOMOBILE EMISSIONS AT INSTATIONARY OPERATING CONDITIONS. *(Messung und Beurteilung von Dieselfahrzeug-Emissionen bei instationaeren Betriebszustaenden). Text in German. Automobiltech. Z. (Duesseldorf), 75(4):133-139, 1973. 11 refs.*

The pollutant emission of a directly injecting diesel engine was measured under simulated driving conditions of a small truck. The results of these measurements were compared with the emissions at stationary operation. A simple test cycle with cruising, acceleration, and deceleration was driven on an engine dynamometer, and the emissions measured. Based on the results of these driving tests, a critical evaluation of the 13-mode California test is given. The driving program of the California test is based on stationary phases in the medium and high rpm range with the exception of idling stages. With a view to the pollutant emission, the important lower rpm range remains nearly unconsidered. This is less important for the oxides of nitrogen because the highest emissions occur in the upper rpm and load range. The peak concentrations of carbon monoxide and hydrocarbons, however, occur in the unconsidered lower rpm range. Here the California test provides no representative data. In view of the prevailing opinion that practically all accelerating processes take place under full load, the California test underrates the oxides of nitrogen and is not realistic at all concerning carbon monoxide, at least for the lower rpm range. If the emissions at stationary driving conditions are to be correctly reproduced by stationary testing methods, the full-load curve must be clearly taken into consideration, particularly with a respect to the oxides of nitrogen.

**28806** **APTIC NO. 50893**

Mikoshi, Shigeharu

CHARACTERISTICS OF A PARALLEL MULTI-STAGE CLASSIFIER. *(Heikoban tadan bunryusochi no tokusei ni tsuite). Text in Japanese. Preprint, Japan Society of Industrial Hygiene, p. 142-143, 1973. (Presented at the Japan Society of Industrial Hygiene, Annual Meeting, 46th, Osaka, Japan, April 6-8, 1973, Paper 227.)*

A multi-stage classifier using natural settling of particles to collect particles was used to examine the collection characteristics and to estimate particle distribution of various sized particles using experimental data. The logarithm normal distribution is defined by the geometric standard deviation and the geometric average particle diameter. The particle distribution can be determined if the size of the particle follows the logarithm normal distribution. The theory agreed well with experimental data.

**28807** **APTIC NO. 50759**

Mogi, S.

AIR POLLUTION MONITORING TELEMETER. *(Taiki osen kanshi teremeta). Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 25(5):41-47, May 1973.*

Telemetry measures pollutants, meteorological factors, and other factors. Many Japanese cities use telemetry for data collection and control. Telemeter systems can inform industries and air pollution control agencies when an alert occurs and when control measures should be taken. Monitoring of pollutants in stacks, fuel consumption, and sulfur content of fuel can also be handled by telemetry. Computers can be used in conjunction with telemetry.

**28808** **APTIC NO. 50395**

Mori, Masaki

MEASUREMENT OF NITROGEN OXIDES IN AIR. *(Taiki chu chisso sankabutsu no sokutei ni tsuite). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 9(3):243-252, March 1973. 9 refs.*

The automated Saltzman method is the usual method for measuring nitrogen dioxide continuously. Recently, the chemiluminescent method has been developed for continuous nitrogen oxide measurements. The Saltzman method is a standard measurement method in Japan. The Jacobs-Hochheiser method is the standard method in the U. S. For the Saltzman method to be affected in continuous monitoring, its ratio of trapping NO2, the Saltzman coefficient, and the ratio of nitric oxide oxidation must be examined. However, with the use of a standard gas and a permeation tube for calibration, the method can be improved. The chemiluminescent method is not sensitive to NO2, so to measure NO2 coexisting with NO, NO2 must be converted to NO and the total measured; however, amines, ammonia, and other nitrogen-containing compounds can also break down and interfere with the measurement.

**28809** **APTIC NO. 50522**

Murai, Toshiharu, Nariyuki Obayashi, and Sotaro Tanaka

COLLECTION AND AUTOMATIC PROCESSING OF ENVIRONMENTAL INFORMATION. *(Kankyo joho so shushu to jido shori). Text in Japanese. Preprint, Japan Society of Civil Engineers, Tokyo, p. 15-21, 1973. (Presented at the Symposium on the Civil Engineering Planning, 7th, Tokyo, Japan, Jan. 24-25, 1973, Paper I-3.)*

The collection and processing of environmental information is needed for effective environmental planning. Remote sensing has been developed to measure information difficult for the human eye to measure, such as the distribution of green areas and the temperature distribution over the earth s surface. Several examples of remote sensing are given. In environmental planning, physical or quantitative analysis as well as qualitative analysis of the environment are needed. The collection of topographic information and the application of automatic processing of it are discussed.

**28810** **APTIC NO. 50389**

Murata, Takeshi, Seiji Takahashi, and Tatsuo Katou

GC-MS COMBINED SYSTEM FOR POLLUTION RESEARCH. *(Kankyo bunseki ni taisuru GC-MS gijutsu). Text in Japanese. Anzen Kogaku (J. Japan Socl Safety Eng.), 12(1):46-55. Feb. 1973. 7 refs.*

The principle of operation, advantages, and applications of the combined gas chromatography-mass spectrometry analytical technique are reviewed. The method was tested in a series of experiments, including the determination of n-methyl aziridine, pyrolidine, dichloromethane, and the lower hydrocarbons at ppb level in the atmosphere; hydrocarbons in exhaust gas; and amines, sulfur compounds, fatty acids, and aldehydes as constituents of bad odors. The design, operation, analytical procedure, and experimental results are examined.

**28811** **APTIC NO. 50772**

Nagasawa, Kaguma

STANDARD SUBSTANCES FOR ANALYSES OF POLLUTION. *(Kogai bunsekiyo hyojun busshitsu). Text in Japanese. Preprint, Japan Society of Analytical Chemistry, Tokyo, 6p., 1973. Japan Society of Analytical Chemistry Symposium on Pollution and Analytical Chemistry, 7th, Tokyo, Japan, March 16, 1973.)*

Standard substances used to analyze pollutants are discussed. A standard value can be used that are useful in obtaining figures represented as maximum allowable concentrations. Sometimes only one standard substance with a two figure value is needed. In a case where the analytical value is very small, a standard substance weighing close to the measurement quantity is required, and this is in general the second or third standard substance used.

**28812** **APTIC NO. 50734**

Nishida, K., T. Honda, and T. Ando

ODOR MEASUREMENT APPARATUS. *(Shukido sokutei sochi ni tsuite). Text in Japanese. Akushu no Kenkyu (Odor Research J. Japan), 2(9):13-21, Jan. 1973.*

Fixed and portable odor monitors are discussed. When the odor sample is too concentrated, it is diluted with air before testing. The measurement apparatus are tested with a known odor before being used to detect unknown odors. Humidity, temperature, and other operating variables are discussed.

**28813** **APTIC NO. 50862**

Okada, Takashi, Kazuko Itoh, and Susumu Kitani

DETERMINATION OF THE NUMBER CONCENTRATION OF AEROSOL PARTICLES BY LIGHT SCATTERING METHOD WITH AN EFFICIENT DEVICE. *J. Colloid Interface Sci., 42(1):88-95, Jan. 1973. 11 refs.*

A method was devised for the measurement of angular intensities of the scattered light of aerosols. The number concentrations of dioctyl phthalate aerosol were determined from the Rayleigh ratio using the working standard method, without affecting refraction and reflection at the glass-air interface of the apparatus. The current method was compared with the experimental method using the glass cell to observe variations in the Rayleigh ratio. This light scattering method can be used to determine size distribution or concentration of particles.

**28814** **APTIC NO. 50767**

Okamoto, Masayoshi, Tetsuya Gatayama, and Hiromi Yoshida

MEASUREMENTS OF CARBON MONOXIDE, METHANE, AND TOTAL HYDROCARBONS BY GAS CHROMATOGRAPHY. *(Gasu kuromatogurafu ni yoru taiki chu no issankatanso, metan, zentankasuiso no sokutei). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 674, 1973. 2 refs. (Presented at the Japan Chemical Society, Spring Meeting, 28th, Tokyo, Japan, April 1-5, 1973.)*

The relationship between the concentrations of pollutants in the air and sampling time was studied. Carbon monoxide, methane and total hydrocarbons were analyzed by gas chromatography-flame ionization. The standard deviations in 36-hour estimates for CO, CH4, and total hydrocarbons were 0.18, 0.13, and 0.17 ppm, respectively. The observed CO and total hydrocarbon values in road measurements were correlated with traffic volume. The coefficients of correlation for CO, CH4, and total hydrocarbon estimated from measurements were CH4-CO, 0.237; CH4 total hydrocarbons 0.39; and CO-total hydrocarbons, 0.796. Non-methane hydrocarbons, were estimated in range of 1.2-3.7 ppm, corresponding to 50-75% of total hydrocarbons.

**28815** **APTIC NO. 50990**

Rabinoff, Robert A. and Benjamin M. Herman

EFFECT OF AEROSOL SIZE DISTRIBUTION ON THE ACCURACY OF THE INTEGRATING NEPHELOMETER. *J. Appl. Meteorol., 12(1):184-186, Feb. 1973. 4 refs.*

The integrating nephelometer is used as a monitor of air pollution by measuring the volume scattering coefficient of a sample of air. Corrections were made to the governing equation for the integrating nephelometer as derived by Middleton. The theory is explained and numerical calculations presented. The calculations show a partial correction of the angular truncation error for most commonly occurring distributions of atmospheric aerosols, and rather serious errors for Junge distributions with small values of volume. (Author abstract modified)

**28816** **APTIC NO. 50469**

Sakata, Mamoru

MEASURING APPARATUS FOR NITROGEN OXIDES. *(Chissosankabutsu no sokutei kiki ni tsuite). Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 25(3):22-29, March 1973.*

Colorimetric methods for nitrogen oxides determination include naphthylethylenediamine (Saltzman) method and the phenyldisulfonic acid (PDS) method which have been adopted as Japanese Industrial Standards. The chemiluminescence method is a new nitric oxide measurement method. Ultraviolet absorption can be used for NO or nitrogen dioxide measurements. Correlation spectrometry can be used for NO, NO2, and sulfur dioxide simultaneous determinations. The ion electrode method lets 0.03% hydrogen peroxide absorb the sample gas; oxygen is blown into the solution to oxidize NO and NO2 to nitrate; then a nitric acid ion electrode is used to measure nitrate and NOx concentration can be determined.

**28817** **APTIC NO. 50532**

Sasama, J. and S. Tsuji

POLLUTION BY PARTICULATE MATTER AND ITS MEASUREMENT. *(Ryushijo busshitsu osen to sono keisoku). Text in Japanese. Kogai Boshi Sangyo (Environ. Pollution Control), 3(4):49-59, April 1973. 6 refs.*

Continuous and automatic measurement methods for particulates are needed to measure particulates effectively. It is difficult to make reliable continuous measurement apparatuses because particulates are fine particles; shapes, sizes, and characteristics vary greatly; particulates undergo complicated movements such as adhering or settling; at sources, exhaust gas temperature is high, exhausts contain water vapor, exhaust gas velocity varies, and static pressure in the flue varies. The stack dust monitor developed by Hitachi is used to monitor dust collection or combustion by continuously measuring the dust concentration in exhaust gas. This apparatus measures 0.5 to 10 micron particles. It is able to measure size distribution.

**28818** **APTIC NO. 50765**

Shigeta, Yoshihiro, Tomohiko Ishiguro, Takashi Hasegawa, and Tatsuo Kato

ANALYSIS OF SULFUR COMPOUNDS IN AIR BY GAS CHROMATOGRAPHY. *(Gasu kuromatogurafi ni yoru taiki chu no iokagobutsu no bunseki). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 678, 1973. (Presented at the Japan Chemical Society, Spring Meeting, 28th, Tokyo, Japan, April 1-5, 1973.)*

A method for the determination of sulfur compounds in the atmosphere by a conbination gas chromatographic-flame spectrophotometric technique is examined. The instrumentation, experimental procedures, and results are reviewed. Hydrogen sulfide, methyl mercaptan, dimethyl sulfide, and dimethyl disulfide were determined at a fluctuation coefficient of less than 10% or a recovery rate of more than 60%. The method is sensitive to the ppb level of these compounds in the atmosphere.

**28819** **APTIC NO. 50987**

Shiomi, Koichi and Shigehiko Hattori

DEVELOPMENT OF AN APPARATUS FOR CLASS ANALYSIS OF HYDROCARBONS (PONA ANALYSIS). *(Tankasuiso no taipu bunseki (PONA bunseki) sochi no shisaku kenkyu). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 908, 1973. (Presented at the Japan Chemical Society, Spring Meeting, 28th, Tokyo, Japan, April 1-5, 1973, Paper 2F34.)*

A new apparatus was developed to separate hydrocarbons into four classes such as paraffins, olefins, naphthenes, and aromatic hydrocarbons and to analyze them quantitatively. The sample is separated by various traps and columns and analyzed at various points by flame ionization detection. An automatic computation system with a digital integrator and a minicomputer is used to analyze the hydrocarbons within 90 min. The reproducibility of the method has been confirmed for an analysis of light naphtha. This technique solves difficulties encountered with conventional gas chromatographic techniques and offers a rapid and precise determination.

**28820** **APTIC NO. 50470**

Shirasawa, T. and Z. Kawase

HARMFUL GAS MEASURING APPARATUS (2). *(Yugai gasu sokutei kiki ni tsuite. (2)). Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 25(3):51-58, March 1973.*

The measurement method for chlorine consists of colorimetric determination using an orthotolidine solution. Another method uses ultraviolet rays for chlorine determination. Hydrogen chloride can be determined by electroconductivity or by colorimetry using a ferric sulfate ammonium and thiocyanate mercuric salt and photocells. Fluorine compounds can be determined by colorimetry and ion electrodes. These methods are continuous, automatic methods which are easy to maintain and control.

**28821** **APTIC NO. 50876**

Shirasawa, Tadao, Chotaro Ohno, and Kazuo Hishida

ANALYTICAL TECHNIQUES IN AIR POLLUTION. *(Sokutei gijutsu). Text in Japanese. PPM (Japan), 4(4):116-136, April 1973.*

Analytical techniques are described for testing sulfur in fuel, ash in coal and petroleum, and the heat generated by combustion. Instruments required for the control of combustion such as a gas analyzer, thermometer, and flowmeter are discussed. Particulate sampling by a dust tube or filter and analytical methods are mentioned. Analysis of fluorides, chlorine, and hydrogen chloride by colorimetry and calibration techniques are discussed. Atomic absorption spectrometry, colorimetry, and polarography are recommended for the analysis of cadmium and lead. Other standard Japanese analytical methods are described.

**28822** **APTIC NO. 50515**

Stepankova, Kamila and Jiri Juranek

SEMIQUANTITATIVE DETERMINATION OF HYDROGEN SULFIDE IN THE AIR. *(Semikvantitativni stanoveni sirovodiku v ovzdusi). Text in Czech. Chem. Prumysl (Prague), 23(48):36-38, 1973. 1 ref.*

The method measuring trace quantities of hydrogen sulfide in the atmosphere to a concentration of 0.000000001 g/l is simple and is designed to replace more complicated methods for H2S determination in the ambient air. Glass detection tubes filled with silica gel impregnated with a complex of silver nitrate and potassium cyanide are used through which a membrane pump draws air at a steady flow velocity of 0.2 l/min. Concentrations of H2S exceeding 0.000001 g/l are evaluated from the length of the brownish yellow colored portion of the silica gel column (which can always be read with an accuracy of 0.5 mm) induced by air drawn through the silica gel as measured by a flowmeter. The length of the colored column is within the narrow concentration span from 0.00001 and 0.000001 g/l directly proportional to H2S concentration. Lower concentrations around 0.000000001 g/l are calculated from the time it takes for the first signs of brownish yellow coloring to appear. The first coloring appears at 0.0000001 g H2S and is not affected by the volume of the gas sample. The concentration can also be read from a calibration curve which is an expression of the function of the concentration of H2S on the volume of the air sample. The accuracy of the method is plus or minus 20%.

**28823** **APTIC NO. 50985**

Stoeber, Werner and Christoph Boose

DEVELOPING FLOW AND PARTICLE DEPOSITION IN HORIZONTAL ELUTRIATORS AND SEMI-DISPERSIVE AEROSOL CENTRIFUGES. *Atmos. Environ., 7(1):119-130, Jan. 1973. 9 refs.*

The deposition patterns of monodisperse aerosols in semi-dispersive aerosol analyzers, such as the horizontal elutriator or the Goetz aerosol centrifuge, were derived theoretically under the assumption that the streamline flow through the duct has a fully developed velocity profile. A general solution for the deposit concentration of monodisperse aerosols is given, with no restrictions as to the type of streamline flow. Developing flow profiles are immaterial in horizontal elutriators where the particle concentration remains constant along the length of the deposit. For existing centrifugal devices, the developing profile caused small changes amounting to a moderate correction of the theoretical results obtained for constant flow profiles, but the basic characteristics of the deposit concentration patterns of the theory still prevail. Actual deviations between experimental findings and theoretical computations in case of the Goetz centrifuge were due to a slow double-vortex flow in the cross-sectional plane of the duct effecting a redistribution of the particle concentration across the deposit. This motion was caused by additional external forces, in particular Coriolis forces, which were not accounted for by the original theory.

**28824** **APTIC NO. 50539**

Sudo, Teruyuki, Kenzo Sakurai, Kazuko Ito, Yoshinobu Mori, and Mine Mori

ANALYSIS OF AIR CONTAMINATED WITH ORGANIC MATERIALS BY THE USE OF A GAS CHROMATOGRAPH. (REPORT NO. 9). ANALYSIS OF ACETONE, ACETALDEHYDE, N-BUTYL ALDEHYDE, AND ISOBUTYL ALDEHYDES. *(Yuki-butsu osen kuki no gasu-kuromatogurafu ni yoru bunseki (dai 9ho), aseton, asetoarudehido, n-buchiruarudehito, isobuchiruarudehido-rui no bunsekiho). Text in Japanese. Mie-Ken Eisei Kenkyusho Nenpo (Annu. Rep. Mie Prefect. Public Health Lab.), no. 18:69-74, March 1973. 9 refs.*

Acetone and aldehydes were separated and determined quantitatively from a large amount of hydrocarbons by gas chromatography with a flame ionization detector. The Rt values were: aldehyde, 7.5 min; acetone, 14.7 min; isobutyl aldehyde, 11.8 min; and n-butyl aldehyde, 16.5 min. Sampling was done with a condensing tube cooled with liquid oxygen. Since hydrocarbons have high polarity, they were retained for a long time in the nonpolar pre-column. Polar substances such as acetone, acetaldehyde, isobutyl aldehyde, and n-butyl aldehyde are retained weakly in the pre-column and passed quickly through the pre-column.

**28825** **APTIC NO. 50540**

Sudo, Teruyuki, Kenzo Sakurai, Kazuko Ito, Yoshinobu Ito, and Mine Mori

ANALYSIS OF AIR CONTAMINATED WITH ORGANIC MATERIALS BY THE USE OF A GAS CHROMATOGRAPH. (REPORT NO. 10). EXAMINATION OF THE METHODS OF ANALYSIS OF SULFUR-CONTAINING COMPOUNDS. *(Yukibutsu osen kuki no gasu kuromatogurafu ni yoru bunseki (dai 10po), Ganryu kagobutsu bensekino no kento). Text in Japanese. Mie-Ken Eisei Kenkyusho Nenpo (Annu. Rep. Mie Public Health Lab.), no. 18:75-79, March 1973. 3 refs.*

A flame photometric gas chromatograph was used to determine mercaptans, methyl mercaptan, dimethyl sulfide, and dimethyl disulfide. Methyl mercaptan was strongly absorbed at 500 ppm. Dimethyl sulfide and dimethyl disulfide were not adsorbed by either of the two chromatographic columns. Since mercaptan saturation was lost within several minutes, the saturation procedure must be repeated at short intervals. Storage of methyl mercaptan decreased by 50% after 14 hr. When methyl mercaptan containing a slight amount of dimethyl trisulfide was stored in an injection tube for 14 hr, the amount of dimethyl trisulfide increased 13 times due to oxidation of methyl mercaptan. Dimethyl sulfide was collected almost completely by condensation and heating, but dimethyl disulfide was lost completely.

**28826** **APTIC NO. 50541**

Sudo, Teruyuki, Kenzo Sakurai, Kazuko Ito, Yoshinobu Mori, and Mine Mori

ANALYSIS OF AIR CONTAMINATED WITH ORGANIC MATERIALS BY THE USE OF A GAS CHROMATOGRAPH. (REPORT NO. 11). COLLECTION OF SULFUR-CONTAINING COMPOUNDS WITH VARIOUS REAGENTS. *(Yukibutsu osen kuki no gasu kuromatogurafu ni yoru bunseki (dai 11po), Kakushu shiyaku ni yoru ganryu kagobutsu no hoshu). Text in Japanese. Mie-Ken Eisei Kenkyusho Nenpo (Annu. Rep. Mie Public Health Lab.), no. 18:80-85, March 1973. 4 refs.*

Small amounts of mercaptans, dimethyl sulfide, and dimethyl disulfide were collected by 5% lead acetate, 5% silver nitrate, saturated silver sulfate, 5% cadmium acetate, 3% mercuric chloride, and 5% mercuric chloride with sodium hydroxide. The sulfur compounds were liberated from solution by the addition of hydrogen chloride. Silver nitrate, silver sulfate, and mercuric chloride with NaOH showed satisfactory collection of the sulfur compounds; however, liberation of the compounds was not satisfactory except with Ag2SO4. Mercaptan liberation was poor even with Ag2SO4. Recovery of dimethyl sulfide was good with AgNO3, HgCl2 with NaOH, and NaCl. Gas chromatography was performed with a Shimadzu chromatograph connected with a flame photometer. Silver nitrate cannot be used as a collecting reagent for dimethyl sulfide, since it oxidizes the dimethyl sulfide to dimethyl sulfoxide.

**28827** **APTIC NO. 50936**

Sugano, Saburo

AN ANALYTICAL METHOD FOR POLLUTION AND ITS PROBLEMS. *(Kogai bunsekiho to sono mondaiten). Text in Japanese. Preprint, Japan Society of Analytical Chemistry, Tokyo, 45p., 1973. (Presented at the Japan Society of Analytical Chemistry, Symposium on Pollution and Analytical Chemistry, 7th, Tokyo, Japan, March 16, 1973, Paper 3.)*

Several analytical methods have been revised to make them simpler and more correct. The revised analytical methods are being tested in water and air analyses. Total mercury in water can be analyzed by an atomic absorption spectrophotometer. The reductive vaporization method, alkyl mercury method, and gas chromatography method are mentioned. Cadmium, lead, copper, zinc, iron, manganese, and nickel can be determined in water or particulate matter by an atomic absorption spectrophotometer. Chromium can be determined by trioctylamino-MIBK extraction an atomic spectrophotometer. Arsenic and cyanides can be determined by the silver diethyldithio-carbamate method. Fluorine and nitrogen can be determined by an ion electrode method. The 4-aminoantipyrine method is used to determine phenol. Total nitrogen compounds and nitrates can be determined by the nitric acid ion electrode method. Nitric oxide in air can be determined by the Saltzman or phenoldisulfonic acid methods.

**28828** **APTIC NO. 50387**

Sugimae, Akiyoshi and Toshio Hasegawa

EMISSION SPECTROGRAPHIC DETERMINATION OF TRACE METALS IN AIRBORNE PARTICULATES COLLECTED ON A MEMBRANE FILTER. *(Membran furuta-jo ni hoshu shita taiki fuyu funjin-chu no kinzoku genso no hakko bunko bunseki). Text in Japanese. Bunseki Kagaku (Japan Analyst) (Tokyo), 22(1):3-9, Jan. 1973. 12 refs.*

A method for the spectrographic determination of trace metals in airborne particulate samples collected on membrane filters was developed. The experimental conditions, analytical technique, operating variables, and results are examined. The method was precise and useful for rapid analysis with minimum pretreatment of samples; the coefficient of variation was about 4.6-14.4%. The analysis was specific for the determination of silicon, iron, zinc, aluminum, magnesium, calcium, lead, manganese, copper, and vanadium.

**28829** **APTIC NO. 50766**

Sugimae, Akiyoshi and Yuzuru Matsuo

METALLIC COMPOSITION IN AIRBORNE DUST. (REPORT NO. 11). EMISSION SPECTROGRAPHIC ANALYSIS OF METAL ELEMENTS IN AIRBORNE DUST BY UNIT METHOD. *(Fuyujin chu no kinzokuseibun. (Dai-11po). Toitsuho ni yoru fuyujin chu no kinzoku genzo no hakko bunko bunseki). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 677, 1973. (Presented at the Japan Chemical Society, Spring Meeting 28th, Tokyo, Japan, April 1-5, 1973.)*

The unit method for the determination of metallic elements in airborne dust samples by emission spectrography was examined. Samples were collected using a high-volume sampler, and the dust samples were then analyzed for contents of silicon, aluminum, calcium, iron, titanium, manganese, vanadium, lead, strontium, nickel, copper, zinc, and magnesium. The experimental equipment and techniques, sample preparation, analytical techniques are reviewed. Trace analysis was by the diffraction grating spectrography.

**28830** **APTIC NO. 50553**

Suzuki, Shin, Nobutoshi Horiuchi, Shohei Kokaya, and Machiko Takano

DETERMINATION OF NITROGEN OXIDES BY THE SALTZMAN METHOD. *(Saltzman-ho ni yoru chisso sankabutsu no sokuteiho ni kansuru kenkyu). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 679, 1973. (Presented at the Japan Chemical Society, Spring Meeting, 28th, Tokyo, Japan, April 1-5, 1973, Paper 2D37.)*

The Saltzman method can determine nitrogen dioxide and nitric oxide if it is oxidized to NO2. The method was studied with respect to temperature, choice of oxidizing agents, and other factors affecting the color reaction. A mixture of NO and nitrogen or NO2 and N2 was passed through an oxidizing solution and an absorbing solution. The Saltzman solution showed maximum absorption at 540 nm and was stable in color after standing for 25 min. Gas absorption was incomplete with one absorbing bottle. No oxidation was observed if the volume of oxidizing solution was below 35 ml; fairly complete oxidation occurred if the volume exceeded 50 ml. Gas flow rate and ozone also affected the Saltzman method.

**28831** **APTIC NO. 50482**

Takano, Masayoshi

TECHNICAL SIDE OF THE ODOR PREVENTION LAW. *(Akushu hoshiho no gijutsuteki sokumen). Text in Japanese. Akushu no Kenkyu (Odor Research J. Japan), 2(9):2-6, Jan. 1973. 7 refs.*

Human tests of odor intensity lack objectivity, cannot be continuous, and require training. Analytical apparatus can be used to objectively detect odors, to pinpoint the odor source, and to make continuous and automatic measurements. Automatic gas chromatographs can be used to determine the fluctuation in odor concentrations. Odor detection must be improved to be able to adequately meet the requirements of various odor prevention laws.

**28832** **APTIC NO. 50406**

Tsendrovskaya, V. A.

SEPARATE DETERMINATION OF INDENE, COUMARONE, STYRENE, CYCLOPENTADIENE, AND DICYCLOPENTADIENE IN THE AIR BY THIN-LAYER CHROMATOGRAPHY. *(Razdelnoye opredeleniye indena, kumarona, stitola, tsiklopentadiena i ditsiklopentadiena v vozdukhe metodom tonkosloynoy khromatografii). Text in Russian. Gigiena i Sanit., no. 1:62-65, 1973. 4 refs.*

A thin-layer chromatographic method for the separate determination of coumarone, indene, styrene, cyclopentadiene, and dicyclopentadiene in the air, as encountered in the manufacturing of indene-coumarone polymers, is described. These substances form mercuric acetate derivatives with a nonaqueous solution of mercuric acetate. Separation and quantitative determination of such derivatives are performed on an alumina layer, using dithizone as the chromogenic agent. The coloration of the spots developed on the alumina layer is fortified by the addition of water. The solvent system chloroform-heptane-ethanol at a ratio of 18:3:1 is used for elution. The lower limit of detectability is 0.5 micrograms of indene, cyclopentadiene, or dicyclopentadiene, and at 1 microgram of styrene or coumarone. The inherent error of the determination is + or 12%. Air sampling is done at a rate of 60 l/hr over at least 2 hr, in a sampler containing alcohol as the absorbent.

**28833** **APTIC NO. 50552**

Tsujino, Yoshio, Kaori Inoue, Hiroshi Hatanaka, and Kiyoshi Imamura

MEASUREMENTS OF NITROGEN OXIDES IN THE ATMOSPHERE. SECOND REPORT. DETERMINATION OF NITRIC OXIDE. *(Taikichu no chisso sankabutsu ni kansuru kenkyu. (2) NO no sokuteiho ni tsuite no kento). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 680, 1973. (Presented at the Japan Chemical Society, Spring Meeting, 28th, Tokyo, Japan, April 1-5, 1973, Paper 2D38.)*

The Saltzman method can be used to determine nitric oxide if it is oxidized to nitrogen dioxide. A solid oxidizer was prepared by dissolving sodium bichromate and concentrated sulfuric acid in water. The solution was slowly dropped on a glass fiber filter paper which was then dried in an oven at 80 C for 40 min and kept in a desiccator since it is hygroscopic. Sample air was passed through the paper. If two to four pieces of paper were used, oxidation efficiency was 100%. Determination of NO2 was not affected by this procedure. Oxidation efficiency was little affected by temperature. The method was used to analyze nitrogen oxides in air from a tunnel at Yao airport with good results.

**28834** **APTIC NO. 50844**

Wagman, Jack and Carl M. Peterson

A CONTINUOUS MONITOR FOR SIZE DISTRIBUTION OF AIRBORNE PARTICULATE EMISSIONS. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Chemistry and Physics Lab. and Environmental Research Corp., St. Paul, Minn., 10p., 1973 (?). 3 refs.*

A new instrument for size classification and analysis of airborne particles is described. It operates on the principle of inertial separation of particles from an airstream by impingement in a series of air cavities followed by controlled flow and collection of particle fractions on active filter sites. Particle size distribution data are obtained automatically by beta attenuation mass measurement of the filter-deposited size fractions. Current design characteristics of the classifier-analyzer include five inertial stages with 50% collection efficiencies at particle diameters in the range of 0.07-10 micron for an inlet flow of 283 l/min, followed by a filtration stage for smaller particles. Preliminary performance data were obtained using spheres containing a mixture of uranine and methylene blue. Advantages of the classifier-analyzer include: capability for aerodynamic size classification and analysis at a relatively high aerosol flow rate and without particle pile-up and blow-off as experienced with impactors; automatic acquisition of particle size distribution data; and collection of size fractions in a convenient form for subsequent chemical analyses. (Author abstract)

**28835** **APTIC NO. 50428**

Weigmann, H.-J.

MEASURING UNITS FOR AUTOMATIC MONITORING OF AIR POLLUTANTS ON WORKING PLACES. *(Messgeraete zur automatischen Ueberwachung von Luftverunreinigungen an Arbeitsplaetzen). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 19(1):1-9, Jan. 1973. 131 refs.*

A list of measuring methods and units for the automatic determination of gaseous pollutants on working places is given. More than 100 pollutants can presently be analyzed in concentrations maximally allowable on working places. Primarily infrared analyzers colorimetric and coulometric units, and units which absorb gases in reagents by means of sequence and multiple samplers and analyze them by means of colorimetry, spectrophotometry or titrimetry are used. Ionization analyzers are increasingly being used instead of IR units.

**28836** **APTIC NO. 50441**

Yamada, Hideo and Shunji Matsudaira

HIGH FREQUENCY TORCH SPECTROGRAPHIC ANALYSIS OF TRACE METALS IN DUST FALL. *(Koshuha purazuma tochi niyoru taiki funjin chuno biryo kinzoku no bunseki). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, Japan, p. 787, 1973. (Presented at the Japan Chemical Society, Spring Meeting, 28th, Tokyo, Japan, April 1-5, 1973, Paper 1E42.)*

The trace analysis of metals in dust fall was accomplished by a high frequency plasma spectrometer in which the high frequency plasma torch was the light source to obtain emission spectra of the metals in the dust. Dust was collected on a glass fiber filter and weighed. Organic particulates were decomposed by a mixture of perchloric acid and nitric acid. Aluminum, calcium, cadmium, chromium, copper, iron, potassium, manganese, sodium, nickel, lead, vanadium, and zinc were determined. While no matrix effects were observed by the presence of highly concentrated iron and aluminum, highly concentrated calcium and sodium lowered the emission intensity of the other elements. A rapid qualitative analysis of dust fall can be performed without tedious preparation of the sample by the high frequency plasma torch emission spectrometry.

**28837** **APTIC NO. 50932**

Yamagata, Noboru

RELIABILITY OF SAMPLING. *(Sanpuringu no shinraido ni tsuite). Text in Japanese. Preprint. Japan Society of Analytical Chemistry, Tokyo, 6p., 1973. (Presented at the Japan Society of Analytical Chemistry, Symposium on Pollution and Analytical Chemistry, 7th, Tokyo, Japan, March 16, 1973, Paper 4.)*

No matter how precisely an analysis is made of a pollutant, the results are governed by the reliability of the sampling method. Atmospheric samples are often taken continuously by section for a long length of time at a fixed point. The dispersion of several components of a soil sample is described. Radioactive strontium(90) was measured in a field in Tachikawa city. The reliable limit value was + or 1.10 (nCi/sq m) for Sr(90) at a risk of 5% and the relative value was 4.8%. Distribution of cadmium, lead, and zinc in a rice field in Yamagata Prefecture was studied with respect to water pollution. In such a case, sampling should be made by taking horizontal dispersion into consideration.

**28838** **APTIC NO. 50449**

Yamate, Noboru, and Akira Inoue

CONTINUOUS ANALYSIS OF CARBON MONOXIDE IN AMBIENT AIR USING ELECTROCHEMICAL ANALYSIS. *(Kankyoyo issanka tanso jido keisoku ni tsuite -- erekutoro kemikaru hoshiki --). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 9(3):292-296, March 1973.*

An electrochemical method was studied for analyzing carbon monoxide. The CO is dissolved in electrolyte and turned into carbon dioxide by electrochemical reaction. The electric potential is then detected by an electrode and recorded. The response time, excluding dead time, of 90% was 25 sec, for 95% response it was 35 sec. Coexisting gases had no effect on the measurement. The apparatus was tested in the field.

**28839** **APTIC NO. 50394**

Yatabe, Teruo

METHODS FOR THE DETERMINATION OF NITROGEN OXIDES IN FLUE GASES. *(Boira haigasu chu no chisso sankabutsu sokuteiho no kairyo). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 9(3):233-242, March 1973. 17 refs.*

The naphthylethylene diamine (Saltzman) method and the phenoldisulfonic acid method are the standard Japanese methods for measuring nitrogen oxides. The Saltzman method is used internationally and is more reliable, but requires a long time to obtain results. A small incinerator was used to compare these measurement methods. The methods are described in detail. Problems of interference by sulfur dioxide and of nitric oxide/nitrogen dioxide ratios are discussed.

**28840** **APTIC NO. 50484**

Yatabe Teruo

HOW TO ANALYZE NOX IN EXHAUSTED GAS. *(Haigasuchu no chisso sankabutsu no bunseki hoho). Text in Japanese. Netsukanri to Kogai (Heat Management Public Nuisance), 25(3):10-21, March 1973.*

Although the Japanese Industrial Standard adopts the Saltzman method for measurement of nitric oxide and nitrogen dioxide and the phenoldisulfonic acid (PDS) method for all nitrogen oxides, these methods have defects. Several new NOx measurement devices have been marketed recently, however, little is understood about interfering elements. Standard NO and NO2 gases were used to compare NOx measurement methods in order to determine interference by other gases and other factors. Automatic methods, the Saltzman method, and the PDS method were tested.

**28841** **APTIC NO. 50926**

Yoshida, Koichi

MEASUREMENT AND TESTING METHODS OF CAR EXHAUST GAS. *(Jidosha haiki gasu no sokutei oyobi shiken hoho). Text in Japanese. Nippon Kikai Gakkai-shi (Journal of the Japanese Society of Mechanical Engineers) (Tokyo), 76(653):628-635, May 1973. 17 refs.*

Measurement and testing methods for automobile exhaust gas are discussed including driving conditions and gas sampling techniques. The methods established by the U. S., Japan, and Economic Council of Europe for gasoline and diesel engines are discussed. The chassis dynamometer can easily reproduce the running conditions of a car including acceleration and deceleration. The direct sampling method takes a part of the exhaust gas from the exhaust pipe of a car and introduces it into an analyzer. The bag sampling method uses a total bag and constant volume sampler. Non-dispersive infrared spectrometry and hydrogen flame ionization analyzers are being used to measure carbon monoxide, hydrocarbons and nitrogen oxides.

## 1972

**28842** **APTIC NO. 50858**

VDI (Verein Deutscher Ingenieure) Duesseldorf (West Germany), Komission Reinhaltung der Luft

GASEOUS EMISSION MEASUREMENT. INFRARED SPECTROMETRIC DETERMINATION OF DIMETHYL FORMAMIDE. *(Messung gasfoermiger Emissionen. Infrarotspektrometrische Bestimmung von Dimethylformamide). Text in German. VDI (Ver. Deut. Ingr.) Richtlinien, 9(2460):1-4, Nov. 1972. 2 refs.*

Waste air is passed through scrubbers filled with tetraethylene chloride, and the dissolved dimethyl formamide is determined by infrared spectrometry. The extinction of the solution at a wavelength of 5.9 micron is a measure for the dimethyl formamide concentration of the air sample. Depending on the expected concentration, between 10 and 100 l of air are drawn at a rate of 30 to 60 l/hr through four successive fritted scrubbers. Amines, ketones, aldehydes, and organic acids may interfere. It might be necessary to select different dimethyl formamide absorption bands. If this is not feasible another analytical method must be applied. Calibration and calculation of the results are discussed.

**28843** **APTIC NO. 50860**

VDI (Verein Deutscher Ingenieure, Duesseldorf (West Germany), Kommission Reinhaltung der Luft

GASEOUS POLLUTION MEASUREMENT. MEASUREMENT OF NITROGEN DIOXIDE CONCENTRATION. RECORDING PHOTOMETRIC METHOD. IMCOMETER. *(Messung gasfoermiger Immissionen. Messen der Stickstoffdioxid- Konzentration. Registrierendes photometrisches Verfahren. Imcometer). Text in German. VDI(Ver. Deut. Ingr.) Richtlinien, 9(2453):1-4, Nov. 1972. 7 refs.*

The Imcometer is a recording photometer with chemical auxiliary reaction for the automatic determination of the average nitrogen dioxide concentration over selectable measuring periods, generally over 10 or 30 minutes. The air sample reacts with a solution producing a red azo dye. The reaction solution is obtained by filling 2.0 g sulfanilamide, 0.050 g N-(1-naphthylethylenediamine)- dihydrochloride, 250 ml 0.1n sodium lye and 10 ml 80% phosphoric acid into a 1-liter flask which is then filled up with distilled or desalinated water. The light penetration of the reaction solution is measured. The color intensity of the reaction solution is a measure for the nitrogen dioxide concentration. The reaction requires a temperature between 0 and plus 30 C. The sampling speed must at least be 2 m/sec.

**28844** **APTIC NO. 50863**

VDI (Verein Deutscher Ingenieure), Duesseldorf (West Germany), Kommission Reinhaltung der Luft

GASEOUS POLLUTION MEASUREMENT. MEASUREMENT OF NITROGEN DIOXIDE CONCENTRATION. RECORDING PHOTOMETRIC METHOD. MIKOMETER. *(Messung gasfoermiger Immissionen. Messen der Stickstoffdioxid-Konzentration. Registrierendes photometrisches Verfahren. Mikometer). Text in German. VDI (Ver. Deut. Ingr.) Richtlinien, 9(2453):1-4, Nov. 1972. 9 refs.*

The Mikometer is a recording alternate light photometer with chemical auxiliary reaction for continuous determination of the nitrogen dioxide concentration. The air sample is drawn through a reaction solution which is obtained by mixing 800 ml distilled or desalinated water with 2 g sulfanilamide, 0.050 g N-(1-naphthylethylenediamine)-dihydrochloride and 30 ml 85% orthophosphoric acid. A red azo dye is formed. After separation of the gaseous phase from the reaction solution the latter is passed through a cuvette located in the radiation path of a photometer. The color intensity of the reaction solution is a measure of the nitrogen dioxide concentration in the air sample. The zero point filter is filled with activated coal which has been heated to 300 C.

**28845** **APTIC NO. 50902**

VDI (Verein Deutscher Ingenieure), Duesseldorf (West Germany), Kommission Reinhaltung der Luft

GASEOUS POLLUTION MEASUREMENT. MEASUREMENT OF NITRIC OXIDE. OXIDATION TO NITROGEN DIOXIDE AND MEASUREMENT BY THE PHOTOMETRIC METHOD (SALTZMAN). *(Messung gasfoermiger Immissionen. Bestimmen von Stickstoffmonoxid. Oxidation zu Stickstoffdioxid und Messung nach dem photometrischen Verfahren (Saltzman)). Text in German. VDI (Ver. Deut. Ingr.) Richtlinien, 9(2453):1-4, Nov. 1972. 3 refs.*

Nitric oxide concentrations of 0.2-1.0 ppm can be oxidized to 90% by manganese oxide. The obtained nitrogen dioxide can be determined by the Saltzman photometric method. One hundred g of manganese oxide are mixed with 25 g of potassium hydrogen sulfate to obtain the oxidizer.

**28846** **APTIC NO. 50964**

VDI (Verein Deutscher Ingenieure, Duesseldorf (West Germany)), Kommission Reinhaltung der Luft

GASEOUS AIR POLLUTION MEASUREMENT. DETERMINATION OF NITROGEN DIOXIDE AND NITRIC OXIDE CONCENTRATION. FUNDAMENTALS AND PHOTOMETRIC MANUAL METHOD (SALTZMAN). *(Messung gasfoermiger Immissionen. Messen der Stickstoffdioxid- und Stickstoffmonoxid-Konzentration. Uebersicht und manuelles photometrisches Verfahren (Saltzman). Text in German. VDI (Ver. Deut. Ingr.) Richtlinien, 9(2453):1-4, Nov. 1972. 11 refs.*

The air sample is drawn through a reaction solution which, under the influence of nitrogen dioxide, turns into a red azo dye. The color intensity of the absorption solution is a measure for the NO2 concentration in the examined air. A description of the sampling apparatus is given. The pump draws on at least 40 l of air/hr. For obtaining the reaction solution, 800 ml distilled or desalinized water are filled into a 1-l measuring flask along with 5 g sulfanilic acid p.a., 0.050 gN-(naphtyl-(1))-ethylenediammoniumdichloride) p.a., as well as 50 ml glacial acetic acid. The analysis must take place at temperatures between 0 and 30 C. A 0.1-molar mercury-(II)-chloride solution serves for masking the sulfur dioxide. The photometric measurement can take place 15 min after sampling at the earliest and must take place 24 hours afterwards at the latest. The optimum measurement range is at 550 nm. For calibration of the photometric measurement, sodium nitrite is added to the reaction solution. The detection limit is 0.4 micrograms NO2 with a statistical certainty of 99.7%.

**28847** **APTIC NO. 50976**

Beitz, Lieselotte and Ulrich Jecht

APPLICATION OF X-RAY FLUORESCENCE ANALYSIS FOR ENVIRONMENTAL PROTECTION. *(Einsatzmoeglichkeiten der Roentgenfluoreszenzanalyse fuer den Umweltschutz). Text in German. Siemens-Z., 46(5):369-373, 1972. 3 refs.*

X-ray fluorescence analysis is a purely physical method. Samples are irradiated with a high-capacity X-ray tube. Through interaction with the atoms of the sample, the primary spectrum is converted into a characteristic fluorescent line spectrum. The wavelength of the spectral lines are characteristic of the various elements in the sample, the intensity of the lines yields information on the concentration. Concentrations from 100% to the ppm range can be determined. The detection limit for most elements is between 0.1 and 10 ppm. Trace elements in concentrations as low as about 0.1 microgram can be measured. This is a sufficiently low concentration for analyzing trace elements in air and water. The reproducibility of the method is plus or minus 0.1% (relative), and the accuracy is plus or minus 2 to 5%. Detection limit, reproducibility, and accuracy depend considerably on the sampling time, which differs from element to element. On the average, sampling lasts 40 sec each time. The X-ray fluorescence analysis is very suitable for the analysis of sodium, magnesium, potassium, calcium, copper, iron, and lead in plant material, and for lead, arsenic, sulfur, or phosphorus in air samples and in waste water samples.

**28848** **APTIC NO. 51027**

Carson, James W., J. D. Young, G. Lege, and Fred Ewald

AN IMPROVED COLUMN FOR BUTADIENE ANALYSIS. *J. Chromatographic Sci., 10(12):737-740, Dec. 1972. 7 refs.*

An improved gas chromatographic column for the analysis of high purity 1,3-butadiene, butadiene plant process streams, and the gas phase effluent from naphtha feed stock thermal cracking furnaces in an ethylene plant, is described. Some 28 components can be identified by this column which are not separated by columns described in current literature. The column and its operation is reviewed, and diagrams of the analysis of butadiene process streams and of the gas phase effluents are presented.

**28849** **APTIC NO. 50578**

Driscoll, J., J. Becker, R. Hebert, K. Horbal, and M. Young

VALIDATION OF IMPROVED CHEMICAL METHODS FOR SULFUR OXIDES MEASUREMENTS FROM STATIONARY SOURCES. *Walden Research Corp., Cambridge, Mass., Environmental Protection Agency Contract 68-02-0009, Program A11010, EPA-R2-72-105, 257p., Nov. 1972. 15 refs.*

NTIS: PB 215887

Wet chemical methods for sulfur oxides analysis were validated in a series of laboratory experiments and pilot plant tests. The sampling methods; results of measurements of sulfur dioxide and sulfur trioxide emissions from oil and coal-fired power plants and fossil fuel combustion sources; pilot plant studies on gray iron foundries, kraft pulping plants, iron and steel manufacturing processes, smelting plants, and sulfuric acid manufacturing processes; and calibration methods are examined. The wet chemical methods include the barium chloranilate procedure for colorimetric analysis, the barium ion-thorin procedure for analysis by titration, and a simple non-specific method involving titration of sulfuric acid with standard sodium hydroxide solution. The experimental and field test results are discussed. The accuracy of the wet chemical methods was estimated at 93 + or 5%.

**28850** **APTIC NO. 50663**

Dubois, L., A. Zdrojewski, T. Teichman, and J. L. Monkman

THE EFFECT OF SAMPLING CONDITIONS ON THE SULFURIC ACID CONCENTRATION FINDINGS IN URBAN AIR. *(L effet des conditions d echantillonnage sur la concentration de l acide sulfurique present dans l air urbain). Text in French. Int. J. Environ. Anal. Chem., 1(4):259-266, 1972. 3 refs.*

The effects of flow rate and the sampling time on the concentration of sulfuric acid were determined by a method for measuring sulfuric acid in air. Samples were taken at a constant flow rate for varying periods of time, and also at varying flow rates at constant time periods. A diminuition of the concentration of sulfuric acid found in air, expressed in micrograms/cu m, was observed for increases in flow rates and sampling times.

**28851** **APTIC NO. 50845**

Esposito, George G.

HIGH SPEED LIQUID CHROMATOGRAPHIC DETERMINATION OF TOTAL AROMATICS IN ENAMEL AND LACQUER SOLVENTS. (FINAL REPORT). *Army Aberdeen Research and Development Center, Aberdeen Proving Ground, Md., Coating and Chemical Lab., Proj. 1T062105A329, Army Materiel Command Contract AMCMS Code 502E.11.29500, Rept. CCL 308, 17p., July 1972. 3 refs.*

NTIS, DDC: AD 748804

Aromatic solvents possess the strongest solvency of the hydrocarbon types, but various air pollution control districts have established maximum limits on the amount that may be present in organic coatings. High efficiency liquid chromatography was used to determine total aromatics in enamels and lacquer thinners. Their separation was obtained across a small bore column containing silica beads of controlled porosity without modifier. The method is rapid, accurate, and applicable to a broad range of solvent blends. (Author abstract)

**28852** **APTIC NO. 50967**

Guicherit, R.

INDIRECT DETERMINATION OF NITROGEN OXIDES BY A CHEMILUMINESCENCE TECHNIQUE. *Atmos. Environ., 6(11):807-814, Nov. 1972. 10 refs.*

Nitrogen dioxide concentrations in outdoor air were determined indirectly by measuring the equilibrium ozone concentration under continuous ultraviolet irradiation. This concentration was measured very accurately by a chemiluminescence technique using Rhodamine B as a light emitting compound. The reaction between ozone and Rhodamine B was highly specific. No other components of air pollution at concentrations occurring in outdoor air interfere. The equilibrium ozone concentration on photolysis of nitrogen dioxide present was a function of the wavelength, the light intensity, and the temperature. By keeping these parameters constant, NO2 concentrations can be determined very accurately with a lower detection limit of 5 micrograms NO2/cu m. The theory of this detection system is described, and the flow scheme and principle component parts of the detection system are presented. The system for the production of NOx for calibration purposes is also described. (Author abstract modified)

**28853** **APTIC NO. 50639**

Heilberg, Ernest and Martin N. Chase

REQUIREMENTS FOR MATHEMATICAL MODELS IN THE TOXICOLOGY INFORMATION PROGRAM. *Chase, Rosen, and Wallace, Inc., National Library of Medicine Contract NLM 69-19, 88p., May 1972.*

NTIS: PB 211339

Requirements for mathematical models in the toxicology information program were developed. The program operations, functions, and data bases were reviewed; generalized requirements for analytical models were determined; existing models were reviewed; and guidelines were developed. The model structure included transport submodels, transfer submodels, transformation submodels, and toxicological effects submodels. The integration of these models into the present program is described.

**28854** **APTIC NO. 50412**

Kettner, H.

ODOROUS SUBSTANCES. *(Geruchsbelaestignede Stoffe). Text in German. Schriftenreihe Ver. Wasser Boden Lufthyg. (Berlin), no. 38:265-279, 1972. 27 refs. (Presented at the Conference on Environmental Pollution and Public Health Service, Berlin-Dahlem, West Germany, March 13-18, 1972.)*

The physiological process of odor perception is reviewed. The sensitivity of the human odor sense varies widely from person to person and substance to substance. Odor perception differed least with ammonia and widest with methyl mercaptan and camphor. Odors can be measured subjectively by smelling and/or objectively by physical-chemical measurements. A brief review of both methods is given. Odors can be removed by combustion, by adsorption on activated coal, by biological dissociation, by scavenging, or by electrostatic precipitation after absorption on water mist. Direct thermal afterburning is expensive if the heat liberated during combustion and supplied to sustain the combustion process is not utilized. In the last few years thermal afterburners with heat recovery have been successfully tried out. Adsorption on activated coal is recommended for particularly small concentrations. Chemical dissociation with ozone and/or chlorine is not worthwhile because the odor is hardly removed and the gas is loaded with additional pollutants. Definitions for various levels of odor pollutants. Definitions for various levels of odor annoyance provided by literature are reviewed and a list of emitters of odorous substances is given.

**28855** **APTIC NO. 50579**

Koszelski, Jan

FEATURES OF AN HMK-LA-GIG CARBON MONOXIDE ANALYZER SENSOR. *(Wlasciwosci czujnika analizatora tlenku wegla typu HMK-la-GIG). Text in Polish. Biul. Gl. Inst. Gorn., 28(2):5-8, 1972. 8 refs.*

A continuously operating sensor for the monitoring of carbon monoxide concentrations in coal mines is presented. The instrument operates through a temperature-dependent catalytic conversion of CO where the temperature is indicated by thermistors. The catalyst consists of a mixture of copper oxide and manganese dioxide powders, referred to as hopcalite, and is readily inactivated by moisture. To prevent measurement errors due to the humidity of the air, a filter including three layers one of calcium chloride on silica gel, the next of magnesium chlorate on silica gel, and the third a molecular sieve, is provided. The influence of the environmental temperature on the measurement data is reduced by using deviation thermistors adjusted through appropriate resistances. A sketch illustrating a cross-section of the sensor and graphs describing the variation of the hopcalite activity as effected by temperature are included. The temperature distribution within the sensor when an air flow containing 0.004% (v/v) CO at a 0.25 l/min rate is illustrated graphically.

**28856** **APTIC NO. 50849**

Koyama, Tahachiro, Masatoshi Nakamura, and Hiroshi Kosaka

DETERMINATION OF SULFATE IONS IN THE ATMOSPHERE BY ATOMIC ABSORPTION PHOTOMETRY. *(Genshi kyuko kodo-ho ni yoru taikichu ryusan ion no sokutei-hoho ni tsuite). Text in Japanese. Hyogo-ken Kogai Kenkusho Kenkyu Hokoku (Rept. Public Nuisance Res. Inst., Hyogo Prefect.), no. 4:29-30, Dec. 1972. 5 refs.*

A method for the determination of the sulfate ion in atmospheric samples was examined. The suspended particulates were collected on filters, and the samples were then analyzed by atomic absorption spectrophotometry. The instrumentation, experimental procedure, sample preparation, and analytical technique are reviewed. The permissible upper limits for ions coexisting with 40 ppm sulfate were 1000 ppm for nitrate, 500 ppm for carbonate, 10 ppm for phosphate, 1000 ppm for ammonium, 500 ppm for divalent lead, 500 ppm for sodium, 100 ppm for magnesium, 100 ppm for calcium, and 100 ppm for iron.

**28857** **APTIC NO. 50984**

LaViolette, Paul A. and Parker C. Reist

IMPROVED PULSATION DAMPENER FOR RESPIRABLE DUST MASS SAMPLING DEVICES. *Am. Ind. Hyg. Assoc. J., 33(5):279-282, May 1972. 3 refs.*

The diaphragm- or piston-type pumps of presently available mass respirable samplers produce pulsed flow rather than a constant flow. This was corrected by using a pulsation dampener in series with the sampling pump. A design is presented for a pulsation dampener which is highly efficient, has minimal air flow resistance, and is small enough for use with samplers presently available in the United States. Tests of the samplers showed a reduction in peak-to-peak amplitude of pulsed flow to within 6% of absolute. Design specifications and the experimental procedure are described. (Author abstract modified)

**28858** **APTIC NO. 50401**

Lovelock, James Ephraim

IMPROVEMENTS IN OR RELATING TO THE DETECTION OF TRACE GASES. *(Assignee not given.) Brit. Pat. 1,266,869. 6p., March 15, 1972. (Appl. June 24, 1968, 20 claims).*

Air contaminants, such as sulfur dioxide, hydrogen sulfide, chlorine, bromine, ethylene, acetylene, carbon monoxide, and nitrogen oxides are detected at ppb level by conversion of the contaminant into a gaseous reaction product which can be detected by electron capture. Oxygen present in the gas sample is removed by a chromatographic column or an electrolytic cell prior to the entry of the sample into the reactor. The gaseous reaction product is scrubbed prior to entry into the electron capture detector.

**28859** **APTIC NO. 50519**

Niki, Eiji

CERAMIC INDUSTRY AND ANALYTICAL MEASUREMENTS FOR POLLUTION. *(Ceramikkusu to kogai keisoku). Text in Japanese. Seramikkusu (Ceramics), 7(12):933-937, Dec. 1972. 7 refs.*

The ceramic industry provides materials which are less harmful than chemicals and pollute little compared to polymer materials. However, it produces certain pollutants. The Japanese industrial standard methods list eight methods including titration, spectrophotometry, conductiometry, coulometry, detector tube, infrared absorption, ultraviolet absorption, and relative ultraviolet spectrometry for sulfur oxide detection at a polluting source, and three methods including conductiometry, spectrophotometry, and lead oxide method for SOx detection in the environment. There are 10 methods listed for the detection of nitrogen oxides at polluting sources and in the environment, seven methods for carbon monoxide, and three methods for gaseous hydrocarbons. Four methods including spectrophotometry, coulometry, chemilumenescence, and ultraviolet absorption are listed for the detection of oxidants in the environment.

**28860** **APTIC NO. 51026**

Papa, L. J. and L. P. Turner

CHROMATOGRAPHIC DETERMINATION OF CARBONYL COMPOUNDS AS THEIR 2,4-DINITROPHENYLHYDRAZONES. I. GAS CHROMATOGRAPHY. *J. Chromatographic Sci., 10(12):744-747, Dec. 1972. 24 refs.*

A gas chromatographic method for the separation and determination of carbonyl compounds as their 2,4-dinitrophenylhydrazones is presented. The method represents a modified version of existing techniques which are prone to thermal decomposition and thus not amenable to quantitative work. The precision and linearity of detector response was improved in the new method indicating that thermal decomposition of the samples was decreased. The application of this method to determine carbonyl compounds in auto exhaust is described. (Author abstract)

**28861** **APTIC NO. 51028**

Papa, L. J. and L. P. Turner

CHROMATOGRAPHIC DETERMINATION OF CARBONYL COMPOUNDS AS THEIR 2,4-DINITROPHENYLHYDRAZONES. II. HIGH PRESSURE LIQUID CHROMATOGRAPHY. *J. Chromatographic Sci., 10(12):747-750, Dec. 1972. 4 refs.*

A high pressure liquid chromatographic system is presented for the separation and analysis of complex mixtures of monofunctional carbonyl compounds as their 2,4-dinitrophenylhydrazones. The sensitivity limit is about 5 nanograms. The quantitative results are obtained by reference to an internal standard. The estimated precision of the method is plus or minus 2.5% relative. Application of the method for the determination of carbonyl compounds in auto exhaust is cited. A second high pressure liquid chromatographic system capable of eluting difunctional carbonyl 2,4-dinitrophenylhydrazones is also described. Calibration methods for both systems are reviewed. (Author abstract modified)

**28862** **APTIC NO. 50513**

Tajiri, A., H. Yoshiyama, and S. Hanajima

DEVELOPMENT OF AUTOMATIC HIGH VOLUME AIR SAMPLER. *(Jido saijinshiki hai boriumu ea sanpura no kaihatsu). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 245. (Nov. 7-9, Paper 199.)*

The new automatic high volume sampler was a re-construction of a high-volume sampler with a cyclone. Ten filter papers were automatically supplied to the filter paper holder from a cassette where 10 sets of 10 filter papers were stored. The sampling pump started to work automatically as soon as the filter papers were fixed. The sampling time of each set of filter papers could be set within 24 hours. The set of filter papers was removed and collected in a back chamber through conveyer after sampling, and a new set of filter papers was reset which required about 1 min. The airflow rate was automatically controlled by a control unit. The maximum flow rate was about 1.4 cu m/min, and an adjustment of 30-100% was possible.

**28863** **APTIC NO. 50749**

Tsuji, Masahiko and Toshihide Okuno

GAS CHROMATOGRAPHIC ANALYSIS OF INORGANIC SULFUR COMPOUNDS. *(Muki io-kagobutsu no gas-kuromatogurafu ni yoru bunseki). Text in Japanese. Hyogo-ken Kogai Kenkyusho Kenkyu Hokoku (Rept. Public Nuisance Res. Inst., Hyogo Prefect.), no. 4:27-28, Dec. 1972. 2 refs.*

The instrumentation, calibration, reagent and sample preparation, and experimental procedure for the analysis of inorganic sulfur compounds by gas chromatography are examined. Determination was by a flame photometric detector equipped with a 394-nm filter. The specific retention times for hydrogen sulfide and carbon disulfide were 1.6 and 4.1 times that of carbonly sulfide, respectively. The relative molecular sensitivity of H2S and CS2 were 1 and 12-13 times that of COS, respectively.

**28864** **APTIC NO. 50404**

Waksmundski, Andrzej, Teresa Czajkowska, Irena Miedziak, and Jan Gawdzik

ANALYSIS OF AIR IN PLANT ROOMS BY THE METHOD OF GAS CHROMATOGRAPHY. *(Analyza atmosfery pomieszczen, fabrycznych me toda chromatografii gazowej). Text in Polish. Przemysl Chem., 51(8):529-533, 1972. 15 refs.*

A direct chromatographic method for the determination of solvent vapor mixtures including methyl-, ethyl-, propyl-, or butylacetate, acetone, methanol, ethanol, propanol, and aromatic hydrocarbons such as benzene, toluene, and xylenes, occurring in paint, lacquer or galvanization shop atmospheres is presented. The procedure can be performed on a Perkin Elmer instrument provided with a flame ionization detector, using nitrogen as a carrier gas and a mixture of polyethylene glycol and 1,2,3 tricyanethoxy propane as a stationary liquid phase. Chromatograms obtained using a polsorb-packed column at 60 C with a 65 ml/min carrier gas flow rate with 10 ml gas or air samples are reproduced. Analysis of air samples containing mixtures of 14 solvent compounds can be performed within 1 hr.

## 1971

**28865** **APTIC NO. 50789**

Kleptsova, A. P. and G. A. Gaziev

PREPARATION OF CALIBRATED MIXTURES OF CARBON MONOXIDE WITH OXYGEN IN CYLINDERS. *(Prigotovlenie kalibrovochnykh smesei okisi ugleroda v kislorode v ballonakh). Hyg. Sanit. (English translation from Russian of: Gigiena i Sanit.), 36(12):415-417, 1971. 4 refs.*

A procedure was described for the preparation of calibrated mixtures of carbon monoxide in oxygen in gas cylinders over the range of concentrations from 0.01-0.1 mg/l. The carbon monoxide concentration in the cylinder remained unchanged as the pressure of the mixture declined over a period of several months. The technique can be used for toxicological experiments and for monitoring the operation of gas analyzers.

**28866** **APTIC NO. 50787**

Markina, N. A.

CHROMATOGRAPHIC SEPARATION OF TRACE AMOUNTS OF COPPER NICKEL AND COBALT IN THE PRESENCE OF IRON IN AIR. *(Khromatograficheskoe razdelenie mikrolichestv medi, nikelya i kobal ta prisutstvii zheleza v atmosfernom vozdukhe). Hyg. Sanit. (English translation from Russian of: Gigiena i Sanit.), 36(11):247-248, 1971. 3 refs.*

The paper chromatographic separation of trace amounts of copper, nickel, and cobalt in the presence of iron in ambient air was investigated. The optimum conditions for the separation were determined. Even small amounts of iron interfered with these determinations. Satisfactory separation was achieved by extracting 50 mg iron/mg ethylacetate, which was extracted from 7 N and stronger solutions of hydrochloric acid by triple extraction. Air samples were taken on analytical aerosol filters. The separation procedure, a combination of extraction and chromatography, is described. The sensitivity of the method was 0.1 microgram nickel and cobalt and 0.2 microgram copper per analytical volume. The method was applied to the evaluation of air around a nonferrous metallurgical works. The analysis is simple, does not require any special apparatus, and can be recommended for extensive use in practical sanitary chemical investigations.

## 1970

**28867** **APTIC NO. 50928**

VDI (Verein Deutscher Ingenieure), Kommission Reinhaltung der Luft

MEASUREMENT OF GASEOUS EMISSIONS. GAS CHROMATOGRAPHIC DETERMINATION OF SOLVENT VAPORS. *(Messung gasfoermiger Emissionen. Gaschromatographische Bestimmung von Loesungsmitteldaempfen). Text in German. VDI (Ver. Deut. Ingr.) Richtlinien, 9(2457):1-8, Aug. 1970. 18 refs.*

General principles and procedural steps involved in the qualitative and quantitative gas chromatographic determination of solvent vapors are presented. Gas chromatographs designed for the determination of solvent vapors are composed of a storage tank for the carrier gas such as nitrogen, helium, argon, or hydrogen, a separation column, a detector with amplifier, and a recorder. Sampling is possible by gas sampling tubes, by a liquid-filled adsorber, required especially for low solvent vapor concentration in the air, and by low-temperature sorption tube from which the sample is transferred into the chromatographic column by desorption at increased temperature.

**28868** **APTIC NO. 50805**

Hansen, Roger, H., and Robert H. Dye

OFF-LINE ANALYSIS PROGRAMS FOR LONG-PATH SPECTROMETER. (FINAL REPORT). *Bendix Corp., Ann Arbor, Mich., Aerospace Systems Div., Environmental Protection Agency Contract 68-02-0249, EPA-R2-72-092, BSR 3322, 55p., 1970 (?). 5 refs.*

NTIS: PB 212625

The purpose of this report is to document the off-line analysis programs for the long-path infrared spectrometer instrument and to provide user instructions for implementing the programs on an IBM-360/50 computer. Theoretical discussion is included only to the extent necessary to permit the proper use of the programs. Thirteen computer programs are documented.

### 1969

**28869** **APTIC NO. 50806**

Landstrom, D. K. and Doyle Kohler

ELECTRON MICROPROBE ANALYSIS OF ATMOSPHERIC AEROSOLS. (FINAL REPORT) Battelle Memorial Inst., Columbus, Ohio, Columbus Labs., National Air Pollution Control Administration Contract CPA 22-69-33, APTD-1501, 53p., Dec. 31, 1969. 8 refs.

NTIS: PB 189282

The feasibility and capability of electron microprobe analysis as a method for obtaining detailed compositional and structural information about pollutant aerosol particles in the atmosphere was studied. Extensive data is presented from known test aerosols, automobile engine exhaust, and atmospheric samples. The sampling method is presently the limiting factor in the detection and analysis of small particles. By preparing samples to minimize X-ray background, particles as small as 0.1 micron can be successfully analyzed. The theoretical limitations of the microprobe for both wavelength-dispersive and energy-dispersive spectrometers are discussed, and recommendations are made about analysis systems for small particles. (Author abstract)

## AIR QUALITY MEASUREMENTS

### 1973

**28870** **APTIC NO. 50886**

Fleischer, M. and A.Forse

CONTINUOUS DUST CONCENTRATION MEASUREMENTS IN THE KAISERSTRASSE IN SAARBRUECKEN FOR THE PERIOD NOVEMBER 1, 1971 TO OCTOBER 31, 1972. *(Kontinuierliche Staubkonzentrationsmessungen in der Kaiserstrasse in Saarbruecken fuer den Zeitraum vom 1. November 1971 to 31. Oktober 1972. Text in German. Schriftenr. Herausgegeben Min. Arbeit, Sozialordnung, Gesundheitswes. des Saarlandes, no. 6:28-31, 1973. 5 refs.*

The dust concentration of the air was measured in the Kaiserstrasse in Saarbruecken with a dust monitor FH62A. The Unit comprises a sampler, a main unit, and a line recorder. The main unit is equipped with a beta-radiator (Krypton 85) and two ionization chambers for the measurement of the beta radiation which penetrates the filter band moving forward step by step. A sampling time of 3 hr was selected. The average dust concentration on week days was 0.12 mg/cu m, on Sundays and holidays 0.09 mg dust/cu m air. About 38% of all concentrations measured were between 0.06 and 0.10 mg dust/cu m air, 12% of the values were above 0.20 mg/cu m. Maximum concentrations of 0.59 and 0.56 mg/cu m (average over 3 hr) were measured in the month of February during a temperature inversion and low wind velocity. On weekdays the maximum dust concentrations were measured between 7 and 10 am and 4 to 7 pm; the minimum between 1 and 4 am. The highest monthly average concentration was 0.21 mg/cu m, the annual average dust concentration O.12 mg/cu m. The dust concentrations were generally higher than in Berlin and Frankfurt.

**28871** **APTIC NO. 50502**

Honda, E.

JAPANESE MEASUREMENTS ON AIRBORNE AND SETTLED MICROBES - LITERATURAL SURVEY. *(Waga kuni ni okeru kuchu fuyukin rakkakin no jissoku shiryo). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 10(7):11-32, Jan. 1973. 25 refs.*

The amounts of airborne and settline microbes in building, offices, movie theaters, barbershops and beauty parlors, factories, hospitals, schools, urban areas, underground streets, and other places are described. Less than 29 microbes were counted at 242 or 266 offices. A grade A theater had 48 microbes in winter and 19 in summer; a grade B theater had 99 and 61 microbes, respectively; a grade C theater had 188 and 170 microbes, respectively. Barber shops had 122 microbes, beauty parlors had 72 microbes. A foundry had 7700 microbes/cu m of air; an aluminum factory had 8900 microbes/cu m of air. Sterilized rooms in hospitals and a pharmaceutical factory had 0-3000 microbes. Schools and residences has 800-12,100 microbes. Urban areas had 6000-68,600 microbes and 20,000 microbes/cu m at a heavy traffic spot. In the winter, underground streets had 44,200 112,400 microbes.

**28872** **APTIC NO. 50768**

Nishikawa, Yoshinori

ON THE CONCENTRATION OF BENZO(A)PYRENE IN THE URBAN ATMOSPHERE. *(Toshi taiki chu no benzo(a)piren nodo ni tsuite). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 675, 1973. (Presented at the Japan Chemical Society, Spring Meeting, 28th, Tokyo, Japan, April 1-5, 1973.)*

The relationship between the concentrations of benzo(a)pyrene and airborne dust in air was investigated. The BaP and dust samples were collected using a high volume air-sampler. The BaP was extracted by a vacuum-sublimation method from the adsorbed sample, separated by thin-layer chromatography, and determined by fluorescence analysis of each spot. The samples for 1971 collected were at two points: A (city center) and B (industrial area). Airborne dust values were higher at B than at A, and BaP values were higher at A than at B. Seasonal peaks appeared in the summer (July, August, and September), with maximum values for any 8-hour period within the day observed at 17.30-1.30.

**28873** **APTIC NO. 50390**

Ose, Youki, Taira Ikeda, Midori Sekiya, and Haruo Ukai

STUDIES ON ENVIRONMENTAL POLLUTION CAUSED BY AIR POLLUTION. V. AIR POLLUTION IN GIFU CITY (2). *(Taiki osen ni motozuku kogai ni kansuru kenkyu (daigoho). Gifu-shi no taiki osen, sono 2). Text in Japanese. Gifu Yakka Daigaku Kiyo (Ann. Proc. Gifu Coll. Pharm.), vol. 21:31-40, March 1973. 6 refs.*

Air pollution was monitored in Gifu city using the filter paper method to determine the concentrations of sulfur trioxide and nitrogen dioxide for 1968-1970. The daily mean SO3 value was 0.26 mg/100 sq cm, with a range of 0.00-0.68 mg/100 sq cm. The daily mean NO2 value was 0.020 mg/100 sq cm, with a range of 0.00-0.067 mg/100 sq cm. Wind speeds for this period were also correlated with the air quality data. Wind roses, monthly NO2 and SO3 variations, and air quality data are listed.

**28874** **APTIC NO. 50843**

Ruff, Ronald F.

APPLICATION OF ADAPTIVE PATTERN CLASSIFICATION TO THE DERIVATION OF RELATIONSHIPS BETWEEN AIR QUALITY DATA. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Meteorological Lab. 27p., 1973. 5 refs. (Presented at the International Symposium on Automated Air Quality Monitoring Networks and Data Analysis, Bilthoven, Netherlands, June 5-8, 1973.)*

In the analysis of air quality data, there is a need for mathematical techniques that are capable of obtaining empirical solutions to highly non-linear relationships between a large number of variables. A technique known as adaptive pattern classification has the capability of obtaining such solutions. Adaptive pattern classificaiton is a computer-oriented technique which seeks a numerical solution between a set of input variables and a categorized dependent variable. It is adaptive in that the computer is programmed to modify the solution as a function of the input data. The program will iterate, by recycling the data, until the empirical solution is optimized within pre-determined limits. The utility of this technique was demonstrated by application of data from the San Francisco Bay Area Air Pollution Control District monitoring network. A relationship, solving for the production of ozone as a function of other pollutant and meteorological parameters, was formulated from the data. Results and conclusions from the analysis are discussed. The potential impact of adaptive pattern classification to the analysis problems associated with the data base to be generated by the Regional Air Pollution Study is considered. The basic data source will be an automated network of 40 stations, connected via communication lines, to a central data acquisition facility. A description of the network and the associated field program is presented. A model to predict violation of state ozone standards is described. (Author abstract modified)

**28875** **APTIC NO. 50883**

Rumler, F., H. Neis, and R. Herbolisheimer

DUST SEDIMENTATION MEASUREMENTS IN THE SAARBRUECKEN-VOELKLINGEN- SAARLOUIS-DILLINGEN AND NEUNKIRCHEN AREA IN THE 1.5.1971 THROUGH 30.4.1972 PERIOD (5TH YEAR OF THE MEASUREMENT SERIES). *(Staubniederschlagsmessungen im Raum Saarbruecken-Saarlouis- Dillingen und NeunkIrchen fuer die Zeit vom 1.5. 1971 bis 30.4. 1972 (5.Messjahr)). Text in German. Schriftenr. Herausgegeben Min. Arbeit, Sozialordnung, Gesundheitswes. des Saarlandes, no. 6:5-16, 1973..*

Results of dust sedimentation measurements, performed by means of Bergerhoff samplers in the Saarbruecken-Voelklingen-Saarlouis- Dillingen and Neunkirchen area from May 1, 1971 through April 30, 1972 are presented and compared with corresponding dust sedimentation measurement data from the previous four years. The yearly amount of settling dust in the Saarbruecken, Voelklingen and Neunkirchen areas was 7248, 8110, and 2404 tons, respectively, while the corresponding values for the previous 1970-1971 measurement period were 6906, 8745, and 2227 tons. Yearly averages of 3987, 5233, and 1607 tons were measured in these three areas in the 1967-1968 period. The percentages of measurement data exceeding the maximum allowable values of 0.42 and 0.65 g/sq m/day as determined for overall areas were 67.25% and 78.76% in the Saarbruecken-Dillingen area, compared to 55.86% and 86.49% for the 1970-1971 period. The corresponding values for the Neunkirchen area were 17.24% and 34.48% down from the 1970-1971 values of 27.59% and 41.38%. The percentages of measurement data exceeding the maximum allowable values of 0.85 and 1.3 g/sq m day as determined for industrial agglomerations were 15.04% and 23%, respectively, in the Saarbruecken-Dillingen industrial area, compared to 12.61% and 20.72% for the 1970-1971 period. The corresponding percentages for the Neunkirchen area were 10.34% and 10.34%, showing no change from the previous measurement period.

**28876** **APTIC NO. 50884**

Rumler, F., H. Neis, and R. Herbolsheimer

CARBON MONOXIDE MEASUREMENTS IN THE KAISERSTRASSE IN SAARBRUECKEN BETWEEN 1.4.1971 AND 30.6.1972. *(Kohlenmonoxidmessungen in der Kaiserstrasse in Saarbruecken vom 1.4.1971 bis 30.6.1972) Text in German. Schriftenr Herausgegeben Min. Arbeit, Sozialordnung, Gesundheitswes. des Saarlandes, no. 6:17-22, 1973.*

For the measurements of the carbon monoxide concentration in the Kaiserstrasse in Saarbruecken, the Uras two unit with a measurement range from 0 to 200 ppm was used. An integrator was connected to the unit which printed out half-hourly averages. The wind velocities were measured at the same time. The largest part of the CO half-hour averages lay between 0 and 20 ppm. Half-hourly averages of more than 20 ppm were more frequent during the winter than the summer. This is due to the fact that in summer dispersion and dilution are better. In winter the off-gases from domestic heating may also add to the carbon monoxide concentration. The highest short-term peak concentrations of 180 to 200 ppm were measured in the months July, August, and September 1971. In April, May, and June 1972 the highest peaks measured were between 140 and 160 ppm. Graphic illustrations of the diurnal CO concentrations reveal maximum concentrations on weekdays between 2 and 5 am, 1 and 3 pm, 7 and 8 am, and 5 to 7 pm. On Sundays the maximum concentrations were measured between O and 1 am., 10 to 12 am, and 8 to 9 pm.

**28877** **APTIC NO. 50885**

Rumler, F., H. Neis, and R. Herbolsheimer

DETERMINATION OF THE OXIDES OF NITROGEN IN BUSY STREETS IN SAARLAND IN THE PERIOD FROM 7.6.1971 TO 30.6.1972. *(Bestimmung von Stickoxiden an verkehrsreichen Strassen im Saarland vom 7.6. 1971 bis 30.6.1972). Text in German. Schriftenr Herausgegeben Min Arbeit, Sozialordnung, Gesundheitswes. des Saarlandes, no. 6:23-27, 1973.*

In busy streets in Saarland the oxides of nitrogen concentration was measured at regular intervals along four measuring loops. By stoichiometric conversion of nitric oxide to nitrogen dioxide and addition to the measured NO2, the sum of NOx was obtained. A concentration of more than 500 micrograms NO/cu m air was measured twice, once it reached 700 micrograms, and once 69 micrograms. For NO2, all measured concentration were below 400 micrograms/cu m. The concentration of the total NOx was twice above the maximum allowable limit value of 1000/micrograms, once it reached 1173 and once 1135 micrograms NOx/cu m air. The weight ratio between NO and NO2 in the street air of Saarland was approximately 1.3 to 1.

**28878** **APTIC NO. 50733**

Saito, Kazuo and Tokihiki Mizobuchi

SULFUR OXIDE INVESTIGATION BY THE PbO2 METHOD. *(Nisanka namari-ho ni yoru iosankabutsu chosa ni tsuite). Text in Japanese. Nara-ken Eisei Kenkyusho Nenpo (Annu. Rep. Nara Prefect. Inst. Pub. Health), no. 6:142-144, Feb. 1973. 1 ref.*

Sulfur dioxide was measured for a month in Nara Prefecture by the lead dioxide method; dust fall was measured by the deposit gauge. Air pollution was slight. The pollution increased during winter and decreased by March. Domestic and industrial heating caused the winter pollution increase. Pollution was higher in the center of the city and in industrial areas.

**28879** **APTIC NO. 50744**

Saito, Kazuo and Tokihiko Mizobuchi

INVESTIGATION OF DUST FALL.. *(Koba baijin chosa ni tsuite). Text in Japanese. Nara-ken Eisei Kenkyusho Nenpo (Annu. Rep. Nara Prefect. Inst. Pub. Health), no. 6:136-141, Feb. 1973. 5 refs.*

Dust fall was measured at five spots in Nara Prefecture for a month. Dust averaged 5.42 t/sq km/mo at one slightly contaminated spot. Dust fall was 4 t/sq km/mo at the other four spots, which is light contamination. Dust was generally acidic. Sulfuric acid, hydrochloric acid, hydrofluoric acid, and nitric acid, occurred in rainwater.

**28880** **APTIC NO. 50908**

Saito, Kazuo and Tokihiko Mizoguchi

MEASUREMENT OF SULFUR OXIDES AND FLOATING DUST BY THE AIR CONTAMINATION AUTOMATIC MEASURING RECORDER. *(Taikiosen jido sokutei kirokukei ni yoru iosankabutsu oyobi fuyu baijin no sokutei ni tsuite). Text in Japanese. Nara-ken Eisei Kenkyusho Nenpo (Annu. Rep. Nara Prefect. Inst. Pub. Health), no. 6:145- 147, Feb. 1973. 2 refs.*

Air quality with respect os sulfur oxides and suspended particulates was measured in Nara. The analytic techniques included the electroconductivity method for SOx and the light scattering method for dusts. Concentrations of both pollutants varied with time of day, with peaks determined at 8-9 am and 5-8 pm. Concentrations were higher in the afternoon than in the morning, and the difference was more significant in the winter than in the summer. The average values were 0.020 ppm for SOx and 50 micrograms/cu m for dusts.

**28881** **APTIC NO. 50912**

Saito, Kazuo and Tokihiko Mizobuchi

FLOATING DUST IN THE CITY OF NARA AND METALS CONTAINED IN IT. *(Nara-shinai no fuyu baijin to ganyu kinzoku ni tsuite). Text in Japanese. Nara-ken Eisei Kenkyusho Nenpo (Annu. Rep. Nara Prefect. Inst. Pub. Health), no. 6:148-151, Feb. 1973. 4 refs.*

Dust fall was measured by a high-volume sampler at four monitoring sites in Nara and the dust samples were analyzed for concentrations of metals, sulfuric acid, and nitric acid. The analytical techniques included atomic absorption spectrophotometry for metal compounds, nephelometry for the H2SO4 group, and colorimetry for the nitric acid group. The average dust fall value was 274 micrograms/cu m, with a maximum value of 382 micrograms/cu m. Of the metals, iron was most predominant, with zinc, lead, copper, and cadmium next in order. The H2SO4 group averaged 2.06 micrograms/cu m, and the nitric acid group averaged 4.03 micrograms/cu m.

**28882** **APTIC NO. 50958**

Takatsuka, Miwa, Teruyuki Tsujikawa, Katsumi Yoshida, and Motohide Murata

THE MEASUREMENT METHOD FOR THE ATMOSPHERIC CARCINOGENS AND CONDITIONS IN MIE PREFECTURE. *(Taikichu hatsugansei busshitsu no sokuteiho to kenka ni okeru jokyo ni tsuite). Text in Japanese. Mie-ken Kogai Senta Nenpo (Mie Prefect. Pub. Nuisance Center Annu. Rep.), no. 1:60-70, March 1973. 33 refs.*

Carcinogenic aromatic hydrocarbons in the atmosphere of Yokkaichi and on busy highways of various cities of Mie Prefecture were analyzed. Chromosorb-W (DMCS) was used as an SE-30 (1.5%) carrier, and stainless column chromatography succeeded in separating 3,4-benzopyrene and perylene. Better results were obtained when the temperature rising speed was slow. The measurements of HC were taken monthly from July 1971 for a year at four locations in Yokkaichi where the pollutants were mostly oil combustion products. The amounts of 3,4-benzopyrene were trace to 140 micrograms/1000 cu m, or average of 4.51 micrograms/1000 cu m, which is lower than the measurements in many other cities. The concentration per g of settling particles was trace-122 micrograms/g, or an average of 40.6 micrograms/g. Pyrene, chrysene, and benz(ghi)perylene showed similar tendencies. All elements had significant correlations with suspended particulates, and the HCs had some correlation with one another. The measurements of HC in the atmosphere of busy highways in main cities of Mie were higher than those in Yokkaichi. But the concentration of carcinogenic elements per g of settling particles was almost the same as that of Yokkaichi. The 3,4 benzopyrene was 7.43-21.6 micrograms/1000 cu m, with an average of 15.2 micrograms/1000 cu m, but the concentration was 39.2 micrograms/g of settling particles. The counts of all elements were high in the areas adjacent to the industrial belt of Yokkaichi, and higher in winter than in summer.

## 1972

**28883** **APTIC NO. 50437**

Suginami Ward Office, Tokyo (Japan), Construction Div.

REPORT ON RESULTS OF AUTOMOTIVE EMISSIONS MEASUREMENTS - RE SPECIAL SURVEY 1972. *(1972-nendo jidosha hiashutsugasu sokuteikekka hokokusho - Rinjichosa bun). Text in Japanese. 21p., Nov. 1972.*

One-hour values of automobile emissions, especially carbon monoxide, were measured in Suginami Ward of Tokyo over 24 hours in Nov. 1972. The 1-hour values of CO were 15.8, 12.3, 12.2, 10.8, 10.2, 9.6, 8.5, 7.2, 6.1, and 3.1 ppm at ten locations. The Japanese standard for 1-hour average is 10 ppm or lower. Values of CO concentrations and automobile traffic for each hour of the 24-hour period are tabulated for each measuring spot.

**28884** **APTIC NO. 50458**

Kobe Municipal Office (Japan), Social Welfare Dept.

KOBE-CITY AIR POLLUTION RESEARCH REPORT, NO. 13 (1970). *(Kobe-shi taiki osen chosa kenkyu hokoku, dai 13po (Showa 45 nen)). Text in Japanese. 48p., Aug. 1972.*

Air pollution was surveyed in Kobe city in 1970. Sources, measuring points, measurement methods, settling and suspended dust concentrations, sulfur dioxide concentrations, wind direction, carbon monoxide concentrations, nitrogen oxides concentrations, and inversions are described. The average settling dust concentrations were 11.05, 20.71, 12.25, and 12.59 tons/sq km/mo at four measuring stations, indicating an increase from the previous year. The 7-month suspended dust average was 0.071 micrograms/cu m at Odada by the digital dust method and 0.057 micrograms/cu m by the low-volume sampler; it was 0.112 micrograms/cu m at Higashinada with the digital dust method and 0.052 micrograms/cu m with the low-volume sampler. Sulfur dioxide averaged 1.25 micrograms/100 sq cm/day at 41 measuring points with the lead dioxide method. The relationship of SO2 to wind direction and speed was studied. The SO2 yearly average at four measuring points was 0.042-0.047 ppm measured by electroconductivity. This was an increase over previous years.

**28885** **APTIC NO. 50490**

Tokyo Metropolitan Government (Japan), Bureau of Environmental Protection

INVESTIGATIONS OF THE POLLUTION CONDITION OF THE AIR USED FOR AIR CONDITIONING OF-

FICE BUILDINGS IN CONGESTED AREAS, AND ITS EFFECT ON THE ROOM ATMOSPHERE. *(Biru misshu chiiki ni okeru kuchoyo gaiki no osen jokyo to sono shitsunai kuki e no eikyo ni kansuru jissoku chosa). Text in Japanese. 126p., Aug. 1972.*

An investigation was carried out in the Marunouchi area of Tokyo from Dec. 1971 to Jan. 1972 for sulfur dioxide and dust in the air used in air conditioning and that in the air in office buildings. The sulfur dioxide particulate concentrations were higher on weekdays and lower on weekends and holidays. The highest SO2 and particulate concentrations were 11.1 pphm and 33.3% (transmittance) outside the Otemachi building and Kotsukosha building, respectively. The degree of pollution on weekdays and holidays was about half that on weekdays. The degree of pollution of air in buildings was lower than that outside the buildings, ranging from 26% to 68% lower.

**28886** **APTIC NO. 50495**

Yamaguchi Prefecture (Japan), Research Inst. of Health

AIR POLLUTION OF WAGI VILLAGE, KUGA COUNTY (REPORT NO. 7). *(Kuga-gun, Wagi-mura no taiki osen ni tsuite (Dai 7ho)). Text in Japanese. Yamaguchi-ken Eisei Kenkyusho Nenpo (Ann. Rept. Yamaguchi Prefect. Res. Inst. Health), no. 14:56-58, Aug. 1972.*

Pollution was monitored at six spots in Wagi Village in Yamaguchi Prefecture during 1971. Sulfur dioxide increased in two spots and decreased in four spots over the previous year. The maximum concentration was 1.72 mg sulfur trioxide/day/100 sq cm measured with the lead dioxide method; the average concentration was 0.70 mg, and 8% decrease from 1970 s 0.76 mg. Concentrations were higher from Feb. to June when north-northeast and east- northeast winds predominate. The decrease is attributed to the use of low sulfur heavy oil. The dust annual average was highest in areas close to the industrial area. The average dust concentration was 5.29 tons/sq km/mo, a 24% decrease over 1970 s average of 6.92 tons. Dust increased from May to Aug., when northeast winds predominated. The decrease in dust is due to decreased consumption of coal. Since heavy oil consumption is expected to increase 1.6 times in 1973 and 1.7 times in 1975, more air pollution is anticipated.

**28887** **APTIC NO. 50647**

GCA Corp., Bedford, Mass., Technology Div.

TRANSPORTATION CONTROLS TO REDUCE MOTOR VEHICLE EMISSIONS IN MINNEAPOLIS-ST. PAUL, MINNESOTA. (FINAL REPORT). *Office of Air and Water Programs Contract 68-02-0041, Proj. DU-72-B895, Pub- APTD-1447, 164., Dec. 1972. 11 refs.*

NTIS: PB 218717

The purpose of this study was to identify and develop transportation control strategies that will achieve the carbon monoxide and oxidant air quality standards required to be met by Minn. in the Minneapolis-St. Paul metropolitan area by the year 1977. An intensive evaluation of all existing meteorological and air quality data was performed. Candidate control strategies were developed, evaluated and ranked regard to technical, legal, institutional, sociological and economic criteria. The obstacles such as, legal authorization, financial requirements, management, enforcement responsibility, political feasibility, economic impact, and user acceptance to the implementation of the candidate strategies are described. A curve showing predicted air quality levels for the years 1973 to 1977 and beyond is presented, based on the implementation of the recommended transportation controls. Control strategies included improved mass transit, improved traffic flow, inspection and maintenance of cars, and retrofit devices.

**28888** **APTIC NO. 50738**

AIR POLLUTION IN THE MINANO AREA OF TAKEO CITY -- MEASUREMENT OF HYDROGEN SULFIDE. *(Takeo-shi Minano-chiki no taikiosen -- Ryukasuiso no sokutei). Text in Japanese. Fukui-ken Kogai Senta Nenpo (Annu. Rep. Fukui Environ. Pollut. Contr. Cent.), no. 1:80-87, March 1972. 2 refs.*

Hydrogen sulfide was measured in the Minano area from 1966 to 1968 near a carbon disulfide manufacturing and a cellophane manufacturing plant. Residents of the area complained of bad odors and metal corrosion. The concentration of H2S exceeded 5 to 20 ppb; in most cases it was 44 to 120 ppb near the factories. High H2S concentrations occurred during the daytime. The wind direction and velocity affected the concentration of H2S to a large degree.

**28889** **APTIC NO. 50752**

INVESTIGATION OF AIR POLLUTION DUE TO CAR EXHAUST GAS IN THE TRAFFIC CONGESTION AREA OF MAIN CITIES IN THE PREFECTURE. *(Kennai shuyo shichoson no kotsu jutai chiku ni okeru jidosha haishutsu gasu ni yoru taikiosen chosa). Text in Japanese. Fukui-ken Kogai Senta Nenpo (Annu. Rep. Fukui Environ. Pollut. Contr. Cent.), no. 1:42-79, March 1972.*

Carbon monoxide, nitrogen oxide, and lead were measured from Oct. to Nov. 1971 at intersections with heavy traffic in Takeo, Ashihara, Ono, Katsuyama, and Fukui cities in Fukui Prefecture. Carbon monoxide was determined by non-dispersive infrared analysis; nitric oxide was determined by a consecutive NOx automatic analyzer; floating dust was collected by a high-volume sampler at 0.5 m from a sidewalk; lead and cadmium concentrations in the dust were determined by atomic spectrophotometry after chemical treatment. Carbon monoxide concentrations were 2.8, 7.8, 4.3, 3.9, 3.5, 4.9, and 3.6 ppm/day on the average at the various measuring points. The CO concentration and the number of passing cars did not correlate except at two points. Nitric oxide concentrations were five to eight times as high as nitrogen dioxide; NO was 0.15-0.4 ppm and NO2 was 0.03-0.08 ppm.

**28890** **APTIC NO. 50753**

INVESTIGATION OF AIR POLLUTION DUE TO CAR EXHAUST GAS IN THE CITY OF TSURUGA. *(Tsuruga-shinai jidosha haishutsu gasu ni yoru taikiosen chosa). Text in Japanese. Fukui-ken Kogai Senta Nenpo (Annu. Rep. Fukui Environ. Pollut. Contr. Cent.), no. 1:13- 41, March 1972.*

Air pollution due to automobile exhaust gas was measured at an intersection with heavy traffic in Tsuruga city. Carbon monoxide was continuously measured at 1.5 m from the center of a sidewalk with a non-dispersive infrared spectrometer. Nitrogen oxide was measured by an automatic analyzer. Lead and cadmium in suspended dust were determined by an atomic spectrophotometer after collection by a high-volume air sampler and chemical treatment. The average CO concentration was 1.7-4.9 ppm/day, which was much less than the environmental standard of 10 ppm. The cadmium concentration was 0.0042 micrograms/cu m/day on the average in the daytime and 0.0033 micrograms/cu m at night. Nitric oxide concentrations averaged 0.005-0.030 ppm in the daytime; nitrogen dioxide averaged 0.012-0.028 ppm.

**28891** **APTIC NO. 50761**

MEASUREMENT OF AIR POLLUTION. *(Taikiosen no sokutei). Text in Japanese. Yamanashi-kenritsu Eisei Kenkyusho Nenpo (Ann. Rept. Yamanashi Prefect. Inst. Public Health), no. 15:25-29, Oct. 1972.*

Dust fall was measured in Kofu city and analyzed for tar, ash, carbon, and soluble components. Dust fall from April 1971 to March 1972 decreased compared over that from April 1970 to March 1971. Sulfur oxides were measured using the lead dioxide method. The SOx concentrations were highest in the central part of Kofu. In July and Sept. (the high wind season), sulfur trioxide concentrations were 1.07 and 1.22 mg/day/100 sq cm. Since the measuring point was near the border of Shizuoka Prefecture, air pollution was probably due to the nearby industrial area. Carbon monoxide, nitric oxide, nitrogen dioxide, hydrocarbons, and lead were measured at the same time. The PH of particulates was also determined.

**28892** **APTIC NO. 50762**

INVESTIGATION OF AIR POLLUTION IN THE CITY OF TSURUGA. *(Tsuruga-shi ni okeru taikiosen chosa). Text in Japanese. Fukui-ken Kogai Senta Nenpo (Annu. Rep. Fukui Environ. Pollut. Contr. Cent.), no. 1:88-116, March 1972. 13 refs.*

Sulfur dioxide, total sulfur oxides, sulfur acid mist, and ammonia were measured on Oct. 26-29, 1971 in Tsuruga city by the electroconductivity method. When sea wind was exchanged with land wind, high concentrations of SO2 and SOx occurred. The sulfuric acid mist concentration was 0.2-4.5 micrograms/cu m; this value was similar to that determined by the national air pollution measuring network. Ammonia concentration was 0-6.8 micrograms/cu m.

**28893** **APTIC NO. 50742**

Akiyama, Jutaro, Seiyo Uchiyama, Isao Takahashi, and Kazuo Kaneda

AIR POLLUTION IN ANNAKA DISTRICT. *(Annaka-chiku no taiki osen ni tsuite). Text in Japanese. Gunma-ken Eisei Kenkyusho, Gunma-ken Kogai Kenkyu Center Nenpo (Annu. Rep. Gunma Inst. Pub. Health Gunma Res. Center Environ. Sci.), no. 4:112-114, Aug. 1972. 3 refs.*

Sulfur dioxide, cadmium, lead, zinc, and copper were determined near a refinery in Annaka district of Gunma Prefecture from Feb. 10-14, from May 23-30, and from Oct. 17-23, 1969. Six days had SO2 concentrations of more than 0.03 ppm. The highest SO2 concentration was 0.05 ppm/day. The hourly maximum was very high, such as 0.79 ppm in May. The amount of floating dust exceeded 300 micrograms/cu m/day on the average. The daily average of metals was 0.03-0.19 micrograms Cd/cu m, 0.29-3.57 micrograms Pd/cu m, 1.37-12.16 micrograms Zn/cu m, and 0.08-0.70 micrograms Cu/cu m. The values were especially high in May. Concentrations were unusually high downwind. The SO2 concentrations rose to a high value within a short time and rapidly decreased. The Cd concentration was generally 10% of that of Pb and 2% of that of Zn.

**28894** **APTIC NO. 50847**

Akiyama, Jutaro, Seiyo Uchiyama, Isao Takahashi, and Kazuo Kaneda

AIR POLLUTION IN SHIBUKAWA DISTRICT. NO. 1. CONCENTRATION OF HYDROGEN CHLORIDE. *(Shibukawa-chiku ni okeru taiki osen. Dai ippo. Enkasuiso nodo ni tsuite). Text in Japanese. Gunma-ken Eisei Kenkyusho, Gunma-ken Kogai Kenkyu Center Nenpo (Ann. Rep. Gunma Inst. Pub. Health Gunma Res. Center Environ. Sci.), no. 4:109-110, Aug. 1972. 2 refs.*

Air quality in Shibukawa city with respect to hydrogen chloride concentrations for June 1969-November 1971 was measured using automatic samplers and impingers. The samples were analyzed by the mercuric thiocyanate method. The highest HCl concentration at 1.40 ppm was determined in May 1971. Concentrations at all eight sampling points increased with time. The average HCl value was about 0.1 ppm in June 1969, with 0.2 ppm determined in August 1971.

**28895** **APTIC NO. 50731**

Hashiguchi, Toshiteru, Yo Yamamoto, Hiromi Matsumoto, Su Kumamoto, Shigehiko Matsumoto, and Nobuaki Izumo

MEASUREMENT OF SULFUR OXIDES IN THE NEIGHBORHOOD OF SENDAI CITY BY THE LEAD DIOXIDE METHOD. *(Sendai-shi shuhen ni okeru nisanka namari-ho ni yoru io sankabutsu no sokutei ni tsuite). Text in Japanese. Kagoshima-ken Kogai Eisei Kenkyusho-ho (Rep. Kagoshima Prefect. Inst. Environ. Pollut. Pub. Health), no. 8:99-100, June 1972.*

The lead dioxide method was used to measure sulfur oxides in Sendai city near a factory from April 1971 to March 1972. Sulfur oxides averaged 0.050-0.233 mg/day/100 sq cm PbO2. The monthly average was the lowest in June when the value was 0.036 mg/day/100 sq cm PbO2. Winds affected sulfur oxide concentrations. The highest monthly average was in March when the value was 0.206 mg/day/100 sq sm PbO2. The highest single value was 0.380 mg/day/100 sq cm PbO2 at Sendai High School. Air pollution levels were generally within permissible levels.

**28896** **APTIC NO. 50850**

Hashiguchi, Toshiteru, Yo Yamamoto, Hiromi Matsumoto, Su Kumamoto, Shigehiko Matsumoto, and Nobuaki Izumo

MEASUREMENT OF ENVIRONMENTAL POLLUTION BY A MEASURING CAR. *(Kogai sokuteisha ni yoru kanshi sokutei). Text in Japanese. Kagoshima-ken Kogai Eisei Kenkyusho-ho (Rep. Kagoshima Prefect. Inst. Environ. Pollut. Pub. Health), no. 8:100-105, June 1972.*

Air quality at various monitoring points in Kagoshima Prefecture was measured with respect to sulfur oxides, suspended particulates, and carbon monoxide using a monitoring car. The analytical methods included conductivity for the determination of sulfur dioxide and non-dispersive infrared analysis for CO. All SOx concentrations were well below the government standard. Suspended particulate values were high in busy city districts, with traffic as the main source. The highest CO concentration at 12.5 ppm was determined at a crossing. The major source of CO emissions was also transportation.

**28897** **APTIC NO. 50851**

Hashiguchi, Toshiteru, Yo Yamamoto, Hiromi Matsumoto, Su Kumamoto, Shigehiko Matsumoto, and Nobuaki Izumo

INVESTIGATION OF DUST FALL IN SENDAI CITY, IZUMI CITY, AND KAMI-YAKU-CHO, KAGOSHIMA PREFECTURE. *(Kagoshima-ken (Sendai-shi, Izumi-shi, Kami-yaku-cho) ni okeru koka baijinryo chosa ni tsuite). Text in Japanese. Kagoshima-ken Kogai Eisei Kenkyusho-ho (Rep. Kagoshima Prefect. Inst. Environ. Pollut. Pub. Health), no. 8:106-119, June 1972. 5 refs.*

Dust fall was measured in Sendai, Izumi, and Kami-Yaku-cho for April 1971-March 1972. In Sendai, 60% of the fall-out was water soluble and was identified as sodium sulfate. The amount of monthly dust fall was 8.29 t/sq km, with a kraft pulping plant as the major point source. In Izumi, 70% of the dust was water soluble, and the main component was also sodium sulfate. Dust fall concentrations ranged within 4.46-5.8 t, with a kraft pulping plant and an alcohol manufacturing factory as the major sources. The largest dust fall value was determined in Kami Yaku-cho, with the monthly maximum at 13.92 t/sq km. The major source was an electrochemical factory which produces silicon steel, metallic silicon, and silicon carbide.

**28898** **APTIC NO. 50751**

Horioka, Masakazu, Keisuke Hoshina, Katuhiro Osaki, and Hiroshi Hasegawa

RESULT OF AN INVESTIGATION OF SULFUR OXIDES BY THE LEAD DIOXIDE METHOD. *(Nisanka namari-ho ni yoru io sankabutsu no chosa kekka). Text in Japanese. Yamagata-ken Eisei Kenkyusho-ho (Annu. Rep. Yamagata Prefect. Inst. Pub. Health), no. 8:118-120, March 1972. 3 refs.*

Air quality with respect to sulfur oxides was measured in the cities of Yamagata and Sakata and the towns of Takabatake and Kokuni for December 1970-November 1971. Samples were collected at 10 monitoring points and were measured by the lead peroxide method. The SOx were determined colorimetrically. The SOx concentration near the center of Yamagata was highest for December 1970-March 1971 and lowest for May-October, with heavy oil combustion for domestic heating as the major source. The SOx content for Sakata city was comparable. The daily averages were 0.52 mg SO3/100 sq cm for December-April and 0.32 mg SO3/100 sq cm for May-November. The effect of wind direction was considered. In Takabatake, where a factory was the major source of SOx, concentrations were very high prior to the installation of control equipment and increasing stack height.

**28899** **APTIC NO. 50547**

Imagami, Kazunari

THE PROBLEMS AND TRENDS OF DUST MEASUREMENT. *(Funjin kogai keisoku no mondaiten to doko). Text in Japanese. Preprint, Ministry of International Trade and Industry, Tokyo (Japan), Public Nuisance Resources Research Inst., p. 1-8, 1972. (Presented at the Public Nuisance Resources Research Institute Research Seminar, 2nd, Tokyo, Japan, Oct. 4, 1972.)*

Dust fall had decreased or showed no marked fluctuations in the past few years in Japan. Suspended dust has increased over the past two or three years. The air pollution control law was revised in Dec. 1970 to reduce the amount of dust to 1/3 to 1/10 the amount allowed in the former law; it was aimed at reducing suspended dust. An environmental standard and measurement method for suspended dust were established in Jan. 1972. Suspended particles were measured at sources by concentration, by grain size, by specific gravity, and by chemical composition. A method for measuring dust in stack gases is described. A method for analyzing chemical composition including lead and cadmium is described.

**3900** **APTIC NO. 50432**

Kitagawa, Y., A. Furukawa, T. Maeda, H. Ryomi, and M. Ito

AEROSOLS OF CITIES IN YAMAGUCHI PREFECTURE (REPORT NO. 1). *(Yamaguchi-ken shotoshi no fuyu funjin ni kansuru kenkyu (Dai 1po)) Text in Japanese. Yamaguchi-ken Eisei Kenkyusho Nenpo (Ann. Rept. Yamaguchi Prefect. Res. Inst. Health), no. 14:71-76, Aug. 1972.*

Aerosols were collected in five cities in Yamaguchi Prefecture. The Ube area has cement, chemical, electric power, and iron and steel industries. The western coastal area of Onoda has cement, chemical, power, and other industrial plants, the southern coastal area has oil refineries and cement plants. Iwakuni and Wagi have oil refineries, petrochemical, pulp, synthetic fiber, and power plants. Yamaguchi city is a commercial area. At Ube, the total aerosol, organic compounds, water soluble sulfate, nitrate, chloride, calcium, magnesium, iron, manganese, lead, nickel, chromium, and cobalt had the highest figures. Onoda had similar figures, nearly as high as Ube, but highest in iron and calcium. Iwakuni and Wagi had lower aerosol and metal concentrations (except nickel and lead) similar to each other since the areas are alike geographically and industrially. Yamaguchi had generally a lower aerosol concentration, but a greater proportion of lead and nitrate, perhaps due to heavy automobile traffic and less atmospheric dispersion. Meteorological conditions, especially wind direction and velocity, greatly affected aerosol concentration. Automobile exhausts affected lead and nitrate concentrations.

**28901** **APTIC NO. 50536**

Kitagawa, Yoshio, Masatoshi Ito, and Akira Furukawa

ON AIR POLLUTION OF SAGEMATSU CITY (REPORT NO. 5). *(Sagematsu-shi no taiki osen ni tsuite (Dai 5ho)). Text in Japanese. Yamaguchi-ken Eisei Kenkyusho Nenpo (Ann. Rept. Yamaguchi Prefect. Res. Inst. Health), no. 14:58-62, Aug. 1972.*

Sulfur dioxide and dust were measured in 25 spots in Sagematsu city. Their averages were 0.57 mg and 5.31 tons, respectively. The SO2 decreased from the preceding year, but in areas close to factories and in hilly areas downwind of factories, high concentration were measured. Dust concentrations were not high, but dust combined with SO2 is dangerously high. Since heavy oil consumption is increasing, low-sulfur fuel must be used and high stacks must be constructed. The southeasternly-southwesternly and west-southwesternly-northwesternly winds affect the city; their frequencies were 31.2% and 11.4%, respectively. These winds were more frequent in winter; heavy oil consumption is greater in winter. The sulfur content in heavy oil was 2.26% in 1970 and 1.97% in 1971. The decrease in SO2 concentrations was due to low-sulfur fuel oil consumption, and construction of high stacks. Dust concentrations were less than in other areas.

**28902** **APTIC NO. 50543**

Kitagawa, Y., H. Ryomi, T. Maeda, and K. Kaneda

AIR POLLUTION OF HOFU CITY (REPORT NO. 3). *(Hofu-shi no taiki osen ni tsuite (Dai 3po)). Text in Japanese. Yamaguchi-ken Eisei Kenkyusho Nenpo (Ann. Rept. Yamaguchi Prefect. Res. Inst. Health), no. 14:62-65, Aug. 1972.*

Air pollution was measured at 13 spots in Hofu city from March 1971 to April 1972. Sulfur dioxide concentrations averaged 0.30 mg; dust concentrations averaged 5.4 tons. Topographic conditions caused the pollutants not to disperse. Northeast winds blew about a third of the year, causing the urban area to be downwind of the factory area. With increased heavy oil consumption, SO2 and odor may increase. However, SO2 did decrease from 0.48 mg in 1969 to 0.42 in 1971. The decrease is due to the decrease in days with east-southeast-south winds. Sulfur in heavy oil decreased from 2.57% to 2.48%, however heavy oil consumption increased. The SO2 concentration paralleled the E-SE-S wind frequency. There was no seasonal change in dust except in August when a typhoon occurred. Heavy oil consumption increased to 262,000 kl (26.2%) over 1970; coal decreased to 25,000 tons (5.2%).

**28903** **APTIC NO. 50550**

Kitagawa, Y., T. Maeda, A. Furukawa, H. Ryomi, and M. Ito

ENVIRONMENTAL ATMOSPHERE SURVEY RESULT OF UBE-ONODA AREA. *(Ube-Onoda chiku kankyo taiki chosa seiseki ni tsuite). Text in Japanese. Yamaguchi-ken Eisei Kenkyusho Nenpo (Ann. Rept. Yamaguchi Prefect. Res. Inst. Health), no. 14:65-71, Aug. 1972.*

Sulfur dioxide, hydrogen fluoride, nitric oxide, nitrogen dioxide, and aerosols were measured in Aug. 1971 at two industrial areas of Ube and Onoda. Sulfur dioxide in Ube averaged 0.034 ppm downwind of industrial plants. The maximum concentration was 0.161 ppm. In Onoda, the area affected by cement and sulfuric acid factories had a 0.040 ppm SO2 concentration. The maximum concentration was 0.164 ppm. The NO and NO2 concentrations were higher downwind of factories, but not as conspicuously as in the case of SO2, perhaps due to automobiles. No correlation between SO2 and the nitrogen oxides was found. The NOx concentrations were higher in the afternoon than morning; NO2 reached 0.03 ppm between 1 and 4 pm. Hydrogen fluoride was higher when the measured area was downwind of industries; the daily average was 0.006 ppm. Average aerosol concentration at Ube, which has large-scale cement, iron, and fertilizer plants, was 88 micrograms/cu m, ranging from 51 to 126 micrograms. Onoda had an average of 187 micrograms/cu m, ranging from 103-266 micrograms. There was no significant correlation between SO2 and aerosol. Sulfate and nitrate were also measured.

**28904** **APTIC NO. 50695**

Koerner, H. J.

SULFUR DIOXIDE AND DUST SETTLEMENT MEASUREMENTS WITH THE SCREEN NET METHOD IN THE CONCENTRATED AREA OF LOWER MAIN REGION. *In: Lufthygienisch-meteorologische Modellunter-*

*suchung in der Region Untermain. 4. Arbeitsbericht. Regionale Planungsgemeinschaft Untermain, Frankfurt am Main (West Germany), p. 96-111, Oct. 1972.*

The dust fall and sulfur dioxide concentrations were measured in the Frankfurt area from July 1, 1971 to June 30, 1972. The measurement grid extended from Hanau Grosskotzenburg in the East along the Main to Frankfurt/Main-Hoechst in the West. The measurement grid with a measuring station density of one/sq km included 203 SO2 measuring points and 142 dust fall measuring sites. The measurement results are presented in tables and maps. Maximum values of SO2 were measured in Frankfurt-Oberrad and the community of Eschborn where an average annual concentration of 0.33 mg SO2/cu m and a maximum concentration of 1.28 mg SO2 cu m was measured. Peak concentrations were measured in Nied and in the area between Rebstock and Friedrich Ebert housing estate. The lowest level of SO2 was measured south of the community of Dietesheim where the average annual concentration was 0.09 mg SO2/cu m and the maximum concentration 0.20 mg SO2/cu m. The lowest dust emissions were measured in Grosskotzenburg with 0.13 g/sq m day (annual average concentration) and 0.25 g/sq m day (average monthly concentration. The highest dust concentrations were measured in the center of Frankfurt between main station and Niederrad with 0.42 g/sq m day and 0.65 g/sq m day.

**28905** **APTIC NO. 50416**

Lahmann, E.

ANALYSIS AND EVALUATION OF THE POLLUTION OF ATMOSPHERIC AIR. *(Untersuchung und Bewertung der Verunreinigungen atmosphaerischer Luft). Text in German. Schriftenreihe Ver. Wasser-, Boden-Lufthyg. (Berlin) no. 38:241-253, 1972. (Presented at the Conference on Environmental Protection and Public Health Service, Berlin Dahlem, West Germany, March 13-18, 1972.)*

Analysis of atmospheric air is difficult for two reasons. The pollutant concentration in the analytical-chemical sense is rather low and it fluctuates widely depending on location and time. These fluctuations are due to influences of emissions and meteorological conditions on emissions. The definitions of several technical terms, such as sampling time, diurnal characteristic, annual characteristic and continuous and discontinuous measurements are reviewed. The determination of dust by the sedimentation method and with filters is also briefly reviewed. The results of analyses of atmospheric air in West German cities, such as Berlin, Hamburg, Munich, Cologne, Essen, Duesseldorf, and Gelsenkirchen, are listed in four tables. In 1968/69 an annual average sulfur dioxide concentration in Berlin Of 0.15 to 0.18 mg/cu m was measured, in Hamburg the concentration was 0.08 to 0.14 mg SO2/ cu m, in Munich 0.05 to 0.08 mg SO2/cu m. The annual average carbon monoxide concentration measured in the same year in Berlin at 24 m was 6.9 ppm; the average dust concentration between April 1966 and March 1967 was 250 micrograms/cu m (day and night) and 350 micrograms/cu m (during the day only).

**28906** **APTIC NO. 50690**

Lahmann, E.

RESULTS OF SPECIAL CHEMICAL INVESTIGATIONS OF THE AIR IN THE UNTERMAIN REGION. *In: Lufthygienisch-meteorologische Modelluntersuchung in der Region Untermain. 4. Arbeitsbericht. Regionale Planungsgemeinschaft Untermain Frankfurt am Main (West Germany), p. 61-75, Oct. 1972.*

The average and maximum sulfur dioxide, nitrogen dioxide, phenol, fluoride, dust, lead, chloride, and formaldehyde concentrations for April 1971 to March 1972 are listed in a table for the untermain region around Frankfurt. The measurements were taken at 43 sites. The average concentrations Of pollutants at the sampling sites are represented graphically on maps. Eight tables contain the frequency distribution of all measured values of the individual substances for various concentration categories. Another table shows the average values of pollutant concentrations for each day. The following peak average values per day were found: sulfur dioxide 222 micrograms/cu m, nitrogen dioxide 122 micrograms/cu m, phenols 13 micrograms/cu m, fluoride 2.23, formaldehyde 25, chlorides 57, dust 620, and lead 5.18 micrograms/cu m. In the winter months October the concentrations of sulfur dioxide, phenol, dust, and lead were higher than the concentrations of sulfur dioxide, phenol, dust, and lead were higher than the concentrations in the summer months. For nitrogen dioxide and formaldehyde it was the other way around. No points of especially high concentration could be found for phenols, fluorides, or formaldehyde. For chlorides, nitrogen dioxide, and sulfur dioxide the highest concentrations occurred in the city of Frankfurt.

**28907** **APTIC NO. 50583**

Matsuda, Y.

ON AIRBORNE TRUE FUNGI. *(Kuchu shinkinso ni tsuite). Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 9(7):42-58, 1972. 47 refs. Translated from Japanese, 38p.*

The concentrations of airborne fungi were measured in Kobe City, and the results were correlated with location, environment, weather conditions, and air quality. Samples were collected by a cascade impactor at 12 locations, including one continuous sampling site and several industrial, commercial, and residential sites. Trend analysis established a rapid rise in fungi concentrations in June which peaked in August and then decreased. The number of fungi/cu m was highest in the commercial districts with 115.4 colonies, followed by the industrial districts with 80.9 colonies, and the residential districts with 68.7 colonies. The number of true fungus colonies was also related to climatic factors, including weather (precipitation and sunshine), temperature, humidity, and wind speed, and air pollution as represented by suspended dust and sulfur dioxide concentrations.

**28908** **APTIC NO. 50403**

Matuszewska, Lucja

**28909** **APTIC NO. 50476**

Rumler, F., H. Neis, and R. Herbolsheimer

RESULTS OF SULFUR DIOXIDE MEASUREMENTS DURING THE PERIOD 5-4-1970 TO 4-30-1971 (FOURTH YEAR OF MEASUREMENT) IN THE AREA SAARBRUECKEN-VOELKLINGEN. *(Ergebnisse der Schwefeldioxidpegelmessungen fuer die Zeit vom 4.5.1970 bis 30.4.1971 (4 Messjahr) im Raum Saarbruecken-Voelklingen). Text in German. Schriftenr. Herausgegeben Min. Arbeit, Sozialordnung Gesundheitswes. Saarlandes, no. 5:5-8, 1972.*

For the fourth consecutive year the sulfur dioxide level of the atmosphere was measured in the area of Saarbruecken Voelklingen. The evaluation was carried out according to the Technical Directives for the Maintenance of Clean Air. The results obtained at 122 measuring points are listed in tables. The emission parameters for each square kilometer were calculated. The emission limit values (0.40 mg SO2/cu m air and 0.36 mg SO2/cu m air) were not exceeded a single time in the measurement period of 1970/71. The highest value found for was 0.11 mg SO2/cu m and 12 0.36 mg SO2/cu m air. The measurements have now been interrupted. They will be continued as soon as basic changes of the SO2 emission are anticipated. This might be the case in the next few years because a large power plant is under construction in the area.

**28910** **APTIC NO. 50477**

Rumler, F., H. Neis, and R. Herbolsheimer

DUST FALL MEASUREMENTS IN THE AREA SAARBRUECKEN-VOELKLINGEN SAARLOUIS-DILLIN-

GEN AND NEUNKIRCHEN IN THE PERIOD 5-1-1970 TO 4e30-1971 (FOURTH YEAR OF MEASUREMENT). *(Staubniederschlagsmessungen im Raum Saarbruecken-Voelklingen- Saarlouis-Dillingen und Neunkirchen fuer die Zeit vom 1.5.1970 bis 30.4.1971 (4. Messjahr)). Text in German. Schriftenr. Herausgegeben Min. Arbeit, Sozialordnung Gesundheitswes. des Saarlandes, no. 5:9-20, 1972.*

For the fourth year of dust fall measurements, the Bergerhoff unit recommended in the Technical Directives for the Maintenance of Clean Air was used. The number of measurement points increased in the area Saarbruecken-Dillingen by two to 191 and decreased in Neunkirchen by one to 39. The emission parameters for uniform areas were calculated according to a mathematical statistical method. Over the entire measurement area the dust concentration increased in the past four years. It is remarkable that the value for the 111 sq km area of Saarbruecken Dillingen reached almost the limit value for industrial centers. In Saarbruecken, an area of 35.5 sq km, the total dust fall in 1967/1968 was 3987 tons/yr, in 1968/69 5438 tons/yr, in 1969/70 6445 t/yr and in 1970/71 6906 t/yr. In Voelklingen, an area of 22 sq km, the total dust fall over the four years was 5233, 5945, 6648, and 8745 t/yr, respectively, and in Neunkirchen, an area of 21.9 sq km, the total dust fall was 1607, 1758, 1902, 2227 t/yr, respectively.

## 1971

**28911** **APTIC NO. 50674**

RESULTS OF MEASUREMENTS OF CO CONCENTRATIONS IN THE AIR ON THE STREETS DURING A TEMPORARY SHUT-OFF OF AUTOMOBILES. *(Hokosha tengoku ji ni okeru, gairo kuki chu no CO nodo sokutei seiseki). Text in Japanese. Ishikawa-ken Eisei Kenkyujo Nenpo (Ann. Rep. Ishikawa Prefect. Inst. Pub. Health), no. 8:82, March 1971.*

Automobiles were not allowed to run on a highway which normally carried 2300-3200 cars/hr in Kanazawa city from noon to 6 pm on Aug. 23, 1970. The average carbon monoxide concentration was 2.0 ppm during the experiment; CO was 17.1 ppm during normal traffic. The CO concentration was 6.6 ppm at another spot along the highway from 3-4 pm on the 23rd and was 9.9 ppm on the 22nd; 1100-1700 cars/hr went past this spot on the 23rd and 1900-2880 cars/hr on the 22nd. At a police station on the highway, the CO concentrations were 9.7 and 16.8 ppm, respectively, on Aug. 23 and 24 from 5-6 pm; 1900-2600 cars went past the station on the 23rd, and 2400-2900 cars on the 22nd. There was a large CO decrease even at areas removed from the highway where no cars ran.

**28912** **APTIC NO. 50715**

THE RESULTS OF MEASUREMENTS OF CO CONCENTRATIONS IN THE AIR ON THE STREET DURING THE WEEK OF DRUGS AND HEALTH. *(Kusuri to kenko no shukan ni okeru gairo kuki-chu no CO nodo sokutei seiseki). Text in Japanese. Ishikawa-ken Eisei Kenkyujo Nenpo (Annu. Rep. Ishikawa Prefect. Inst. Pub. Health), no. 8:83, March 1971.*

Measurements were made using an infrared analyzer of the non- dispersion type between 8 o clock in the morning and 6 o clock in the afternoon. At Korinbo, which is the busiest point in Kanazawa City, 3700-4900 cars ran through in an hour. The average carbon monoxide concentration for an hour was 13.5 ppm on Oct. 12, 1970. This concentration was even higher than that found in Oharacho, Kasumiga-seki, and Itabashi in Tokyo, where the average concentration for 10 hours in the day was 6-10 ppm in 1969. At another intersection in Kanazawa, where 2100-2500 cars passed/hr the average was 6.6 ppm. At the Komatsu Station, Komatsu City, 900-1400 cars passed/hr and the CO concentration was 4.5 ppm. At Kawaramachi, Nanao City, 1400-2200 cars passed/hr; the CO concentration was 4.6 ppm. The wind speed was 0.1-0.3 m/sec at all the measurement sites except Kawaramachi, Nanao, where the wind speed was 0.3-3.9 m/sec. The CO concentration on the streets is particular to the spot and is not related with the population of a city, because the pollution by cars is quite localized.

**28913** **APTIC NO. 50811**

Charpin, Jacques, M. Lauriol-Mallea, M. Renard, and H. Charpin

FUNGAL POLLUTION IN BAKERIES. *(Etude de la pollution dans les boulangeries). Text in French. Bull. Acad. Nat. Med. (Paris), 155(3-4):52-55, 1971. 14 refs.*

A total of 288 weekly tests performed in the shops and laboratories of seven commercial bakeries over a period of 1 year disclosed that in the shops the fungal density was six times and in the laboratories 30 times that of an average household atmosphere. This fungal pollution in bakeries was not subject to seasonal variations due to the constant year-round temperature of around 35 C. Out of 100 bakers, 16 were allergic; of 500 other bakers after 10 years of work, 25% manifested symptoms of coryza and asthma.

**28914** **APTIC NO. 39317**

Larsen, Ralph I.

A MATHEMATICAL MODEL FOR RELATING AIR QUALITY MEASUREMENTS TO AIR QUALITY STANDARDS. *Environmental Protection Agency, Research Triangle Park, N. C., National Environmental Research Center, Office of Air Programs Pub-AP-89, 56p., Nov. 1971. 18 refs.*

NTIS: 205277; GPO

Analyses of air pollution data indicate that air quality measurements tend to fit a general mathematical model having the following characteristics: pollutant concentrations are lognormally distributed for all averaging times; median concentrations are proportional to averaging time raised to an exponent; and maximum concentrations are approximately inversely proportional to averaging time raised to an exponent. These characteristics have been used to develop equations for calculating the geometric mean, standard geometric deviation, annual maximum concentration, and various percentile concentrations of air pollutants. To illustrate the predictive as well as the interpretive value of the model, parameters have been first calculated for one averaging time for actual data and then calculated for other averaging times by means of the model. Maximum concentrations calculated with the model are compared with measured values for seven gaseous pollutants (sulfur dioxide, carbon monoxide, hydrocarbons, nitric oxide, nitrogen dioxide, nitrogen oxides, and oxidant) obtained during continuous sampling for up to 7 yrs in eight cities (Chicago, Cincinnati, Denver, Los Angeles, Philadelphia, St. Louis, San Francisco, and Washington) under the Continuous Air Monitoring Program (CAMP). Averaging times for which the model is most and least accurate are discussed. The analytic techniques described can be used to compare ambient pollutant concentrations with air quality standards and to calculate pollutant parameters for various averaging times. The resulting information can be used in developing implementation plans and emission standards. (Author abstract modified)

# ATMOSPHERIC INTERACTION

## 1973

**28915** **APTIC NO. 50534**

SOME PROPOSALS CONCERNING DIFFUSION CALCULATION. *(Kakusan keisan ni kansuru jakkan no teian). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 9(2):133-136, Feb. 1973.*

Formulae are given for dispersion, concentration variance, and transfer ratio. Dispersion can be explained using a concentration curve. Velocity presents a problem in dispersion calculations; therefore simulation is proposed. Random sampling numbers are used to simulate the random movement of particles in dispersion. Each particle is assigned a random sampling number, so that each can be assigned 10 g or 100 g. If 10 kg of sooty smoke is emitted, it can be divided into 1 g units. This method makes easy three dimension calculation, traces hourly concentration, allows the alteration of flow direction and velocity in the middle of the calculation, and is not hampered by the velocity problem. Computers made this type of calculation possible.

**28916** **APTIC NO. 50542**

Aida, Masaru, Miyoko Kawakami, and Shinichi Nagai

THREE-DIMENSIONAL STRUCTURE OF AIR POLLUTION IN TOKYO AND ITS NEIGHBORING PREFECTURES - FROM THE STANDPOINT OF METEOROLOGICAL OPTICS. *(Shutoken no taikiosen no rittaikozo - Kishokogakuteki tachiba kara) Text in Japanese. Preprint, Japan Architectural Inst., Tokyo, p. 59-61, 1973. 2 refs. (Presented at the Symposium on the Urban Construction and Weather, 3rd, Tokyo, Japan, March 9-10, 1973.)*

The dome-like stratum of smoggy air hovering over a large city is one cause of the heat island effect. An optical method is more economical and better suited for analysis of three-dimensional structure of aerosols over urban areas. The insolation decrease caused by smoggy air over Tokyo and its neighboring Prefectures was studied by measuring light wavelengths with a smogmeter. The spatial quantitative and particle size distributions of aerosols were determined. Optical or spectrophotometric observation of the smoggy air is continuing at spots along area highways. Results are presented in graphs.

**28917** **APTIC NO. 50834**

Boyak, B. E. and D. W. Kearney

PLUME BEHAVIOR AND POTENTIAL ENVIRONMENTAL EFFECTS OF LARGE DRY COOLING TOWERS. (FINAL REPORT). *Gulf General Atomic, San Diego, Calif., Atomic Energy Commission Contract AT(04-3)-167, AEC Proj. 47, Gulf Proj. 0403, Rept. GA-A12346, UC-53, 191p., Feb. 1973. 137 refs.*

NTIS: Gulf-GA-A12346

Hot air plume behavior and possible effects on the environment of the waste heat rejected from dry cooling tower systems of 1000-megawatt power generating plants were studied. Data on dry cooling tower systems, the behavior of dry hot plumes, and the environmental and meteorological effects associated with the discharge of energy directly to the atmosphere were reviewed. Calculations were used to define the plume produced by dry cooling tower systems. Heat rejection rates for the representative power plants varied from 4.9 times 10 to the ninth power Btu/hr for the fossil-fuel plant to 7.6 times 10 to the ninth power for the light water reactor plant. Cloud formation and precipitation, local induced winds, penetration of atmospheric inversion layers, local heating, noise, aesthetics, land usage, and other effects were considered. The potentially beneficial effects of dry cooling towers included fog dispersion by the large heated plumes above the towers and by induced air circulation near the towers and cleansing of a stagnant air basin as the polluted air is carried above the trapping inversion layer.

**28918** **APTIC NO. 50634**

Brier, Glenn W.

VALIDITY OF THE AIR QUALITY DISPLAY MODEL CALIBRATION PROCEDURE. (FINAL REPORT). *Environmental Protection Agency, Research Triangle Park, N. C., Meteorological Lab., EPA-R4-73-017, Program Element A11009, 28p., Jan. 1973. 10 refs.*

NTIS: PB 218716

The study examines, from the point of view of statistical theory, the validity of the calibration procedure that is currently used with climatological models of multiple-source urban air pollution, such as the Air Quality Display Model, and particularly its use as a basis for predictions of air quality that would result from distributions of emissions differing from that for which the calibration was actually established. Suggestions for possible improvement of the procedure are given.

**28919** **APTIC NO. 50827**

Crandall, W. K., C. R. Molenkamp, A. L. Williams, M. M. Fulk, R. Lange, and J. B. Knox

AN INVESTIGATION OF SCAVENGING OF RADIOACTIVITY FROM NUCLEAR DEBRIS CLOUDS: RESEARCH IN PROGRESS. *California Univ., Livermore, Lawrence Livermore Lab., Atomic Energy Commission Contract W-7405-Eng-48, DNA contract IACRO-73-814, Subtask W99QAXTD87, TID-4500, UC-53, 42p., Jan. 17, 1973. 45 refs.*

NTIS: UCRL-51328

The following research projects are discussed in this progress report: A study of the dynamics of cumulus cloud interaction with a nuclear debris cloud to determine possible enhancement or reduction in peak surface concentrations, microphysical interactions of debris particles with cloud droplets and raindrops to determine rainout and washout efficiencies; a study to determine the feasibility of rendering the debris particles non-wettable, thereby effectively making the rainout coefficient negligibly small; effects of dry deposition due to larger numbers of low yield devices within a confined area; and the development of a three dimensional atmospheric diffusive particle-in-cell code (ADPIC) capable of calculating the time-dependent distribution of air pollutants under conditions of turbulent diffusion and wind shear. A model is given for describing removal of debris from air in which the rain rate is constant. In-cloud scavenging and rainout processes are considered with regard to inertial capture, wettable surfaces, nucleus particle size, and nucleus composition. The surface energies of various materials are listed. The ADPIC code is acapable of calculating the time dependent distribution of air pollutants under many conditions, including strongly distorted advection wind fields and calm conditions for which Gaussian models are not suitable. The code solves the three dimensional advection-diffusion equation in its conservative form for a mass-consistent advection field by finite difference approximations in Cartesian coordinates. The method is based on the particle-in-cell technique with the pollutant concentration represented statistically by impedded Lagrangian marker particles in an Eulerian grid. The computer time for a 15 by 15 by 15 equal to 3375 cell Eulerian grid with 4000 particles is approximately 1 sec/time cycle on a Control Data Corp. 7600 computer.

**28920** **APTIC NO. 50836**

Dimitriades, B.

PHOTOCHEMICAL OXIDANTS. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., 14p., April 1973.*

The problem of photochemical oxidants in the United States is examined, with special attention focused on the oxidant abatement strategy devised and recommended by the Environmental Protection Agency. Available scientific evidence is analyzed to show the bases and rationale of the EPA recommended national air quality standard for hydrocarbons and for determining regional control requirements for achievement of the oxidant standard. Inadequacies of the present strategy and efforts for improvement were reviewed. (Author abstract)

**28921** **APTIC NO. 50986**

Fujii, Tetsu, Itsuki Morioka, and Haruo Uehara

BUOYANT PLUME ABOVE A HORIZONTAL LINE HEAT SOURCE. *Intern. J. Heat. Mass Transfer, 16(4):755-768, April 1973. 19 refs.*

Equations concerning the steady laminar plume above a horizontal line heat source are solved. New numerical solutions are presented for Prandtl numbers of 0.01, 0.03, 0.1, 0.3, 0.7, 1.0, 3.0, 5.0, 10.0, 30.0, and 100.0. The profiles of vertical velocity components and temperature are graphed to improve the interpolation of arbitrary Prandtl numbers. Experiments were done on plumes in air, water, spindle oil, and liquid silicone and compared to the theoretical results. While the natural motion of an undisturbed plume was extremely slow, it did resemble the fluttering of a flag. Photographs are presented of typical plume motion in spindle oil. Temperature distributions in the experiments corresponded to theoretical results. Maximum plume temperatures in air were about 15-20% lower than the theoretical predictions, while those in water and spindle oil were in good agreement with the theoretical predictions. All numerical results and graphs are included. (Author abstract modified)

**28922** **APTIC NO. 51016**

Garnett, Alice

EMISSIONS, AIR POLLUTION AND THE ATMOSPHERIC ENVIRONMENT. PAPER 8. *J. Inst. Fuel, 46(382):39-45, Jan. 1973. 9 refs. (Presented at the Institute of Fuel, National Convention, 1st, Sheffield, England, June 5-8, 1972.)*

Changing patterns of pollution and their relationships to both emissions and land use and to differences and variations in the natural physical and atmospheric environment are reported. Continuous daily and hourly pollution sampling of smoke and sulfur dioxide at a large number of sites in Sheffield, together with the continuous recording of climatological parameters has been carried out. The results are discussed with reference to case studies for specific days to demonstrate relationships in the occurrence of high pollution pulses and hourly changes in the stability of the atmosphere as assessed by a lapse rate index. A case of sulfur dioxide levels exceeding 3000 micrograms/cu m is examined with reference to the associated hourly changes in weather parameters. Examples of two days in the month of January experiencing high pressure and calms but dissimilar diurnal pollution patterns are discussed with respect to differences in the nature of the air masses concerned in each case. (Author abstract modified)

**28923** **APTIC NO. 50457**

Katsuda, Takashi, Shuzo Murakami, Kiyoshi Uehara, and Yuji Marutani

ACTUAL MEASUREMENT OF THE URBAN AIR CURRENT (OCCURRENCE FREQUENCY OF STRONG AND WEAK WINDS). *(Shigaichi kiryu no jissoku (Kyofu to jakufu no hassei hindo)). Text in Japanese. Preprint, Japan Architectural Inst., Tokyo, p. 11-16, 1973. 5 refs. (Presented at the Symposium on the Urban Construction and Weather, 3rd, Tokyo, Japan, March 9-10, 1973.)*

Seven anemometers were installed at 45.6 m, 27 m, 4 m, 6 m, and 23 m from the ground in Tokyo to measure wind direction and speed from Aug. 1972 to Dec. 1975 to determine if construction of a skyscraper will increase the frequency and length of weak or strong winds. Results of the data obtained so far are given and compared with wind tunnel tests. The buildings seem to affect winds.

**28924** **APTIC NO. 50991**

Khemani, L. T. and Bh. V. Ramana Murty

RAINFALL VARIATIONS IN AN URBAN INDUSTRIAL REGION. *J. Appl. Meteorol., 12(1):187-194, Feb. 1973. 14 refs.*

Rainfall data for 1901-1969 at three stations in the region downwind of the urban industrial complex at Bombay, India, and at two stations in the nearby non-urban region were analyzed. The effects of heat and water vapor pollution and of particulates on cloud stability are discussed. Mean seasonal rainfall during the summer monsoon for each decade, and the percentage variation occurring in each decade with respect to the earliest decade are presented. The double mass curve technique was used to examine the influence of urban pollution on rainfall. The trend index of the ratio of rainfall of each station was calculated for each decade; the index was also calculated for each of the two periods 1901-1940 and 1941-1969. All calculations and data are included. The study indicated that, with respect to the non-urban region, the region downwind of the urban industrial complex recorded an increase of rainfall by about 17%, significantly less than the 1% level, during 1941-1969 which was the period of increased industrialization. (Author abstract modified)

**28925** **APTIC NO. 50848**

Kimura, Kenichi, Mitsuharu Udagawa, and Shunsuke Kubo

URBANIZATION AND THE HEAT ISLAND PHENOMENON. *(Toshika to hiito airando gensho). Text in Japanese. Preprint, Japan Architectural Inst., Tokyo, p. 17-42, 1973. 13 refs. (Presented at the Symposium on the Urban Construction and Weather, 3rd, Tokyo, Japan, March 9-10, 1973.)*

Urbanization causes heat islands in which temperatures in the downtown area are higher than in the surrounding areas. Evaporation, artificially produced heat, and other factors can be assessed by mathematical models. Urban temperature changes are affected by shapes of structures and spaces in cities, structural changes of the atmosphere over the city, physical changes of the underground in the city, and city energy consumption. Degree of sparseness, evaporation area, albedo, atmospheric transmittance, conductivity and diffusion of heat, and energy consumption are variables which can be used to produce a degree of urbanization mathematically. Ground-surface temperature, heat transfer by turbulence, underground heat conductivity, and the quantity of ground-surface long-wave radiation in the summer and winter are calculated for respective ranks given by the indexes. The relationship of temperature changes to various variables are discussed. Decrease of the evaporation area in a city is the primary cause for the heat island phenomenon at the ground-surface level.

**28926** **APTIC NO. 50388**

Kitagawa, Tetsuzo

EXHAUST GAS OF AIRCRAFT AS A POSSIBLE ORIGIN OF PHOTOCHEMICAL SMOG. *(Kokagaku sumoggu no hasseigen to shite no hikoki haigasu no kanosei). Text in Japanese. Anzen Kogaku (J. Japan Soc. Safety Eng.), 12(2):117-128, April 1973. 20 refs.*

The exhaust gas from aircraft was investigated as a possible origin of photochemical smog. When airplanes approach or take off from an airport, they must pass through a temperature inversion layer with a vertical width of 200-300 m and at an altitude of about 300-2000 m. The exhaust emissions from the aircraft, corresponding to the emissions of over 10,000 automobiles, are discharged into the inversion layer which is a stable laminar air flow moving slowly leeward. High concentrations of nitrogen oxides and unsaturated hydrocarbons are retained in the layer because of little turbulence. The photochemical reaction of the NOx and hydrocarbons in the gas mass is accelerated by the abundant ultraviolet rays at those altitudes, and an aerosol mass of mist particles is formed and falls to the ground surface. This theory was tested by correlating smog incidents and locations with the locations of airports and main courses of aircraft.

**28927** **APTIC NO. 50818**

Kokin, Allan, Lowell G. Wayne, and Melvin Weisburd

CONTROLLED EVALUATION OF THE REACTIVE ENVIRONMENTAL SIMULATION MODEL (REM). VOLUME II. USERS GUIDE. *Pacific Environmental Services, Inc., Santa Monica, Calif., Environmental Protection Agency, Office of Research and Monitoring Contract 68-02-0345, EPA-R4-73-013b, 157p., Feb. 1973. 3 refs.*

NTIS: PB 220457

The design, operation, and use of the Reactive Pollution Environmental Simulation Model (REM) are described. The REM operation and applicability are explained. Detailed instructions for setting up input decks are given. The methodology, techniques, and calculational procedures employed in REM are presented, and possible program modifications are discussed. Algorithm descriptions, flow charts, complete data input instructions, sample input decks, and a glossary of program terms and program listings are provided. The REM model allows the computation with a computer program of photochemical mechanisms. The computer program has been designed as a detailed episode model for chemical kinetics, with additional modules linked up to form a complete atmospheric system. The modules presently in the system determine the necessary meteorological parameters, ultraviolet radiation, the rate of absorption of actinic light by nitrogen dioxide, and emissions due to traffic and area sources. The facility exists to incorporate modules to calculate the emission due to large point sources and the effect of vertical diffusion should practical and effectual methods be found to perform these tasks. (Author introduction modified)

**28928** **APTIC NO. 50895**

Kondo, Jiro

STUDY ON AIR POLLUTION DUE TO CAR EXHAUST GAS -- USING A MATHEMATICAL MODEL. *(Jidosha haishutsu gasu ni yoru taiki osen no kenkyu -- Sugaku moderu o chushin ni shite). Text in Japanese. Nippon Kikai Gakkai-shi (Journal of the Japanese Society of Mechanical Engineers) (Tokyo), 76(653):619-627, May 1973. 15 refs.*

A mathematical model is described to study air pollution by automobile exhaust and diffusion. Eddy diffusion based on the turbulence theory and the relationship between weather conditions and the diffusion width of smoke still must be studied. Photochemical smogs must be studied by inquiries into chemical reactions, transport and diffusion of pollutants from fixed sources, fuel consumption engine characteristics, and emission factors. The diffusion model is useful in planning from standpoints of efficiency and costs and in evaluating city road plans.

**28929** **APTIC NO. 50544**

Kunitomo, Hajime

MISCELLANEOUS POLLUTANTS IN THE ATMOSPHERE AND INSOLATION. *(Taiki no kyozatsubutsu to nissha). Text in Japanese. Preprint, Japan Architectural Inst., Tokyo, p. 69-73, 1973. 7 refs. (Presented at the Symposium on the Urban Construction and Weather, 3rd, Tokyo, Japan, March 9-10, 1973.)*

Pollutants such as dust, fume, smoke, and mist affect insolation. The optical nature of individual particulates or gaseous pollutants are discussed. The optical constant at each wavelength must be studied. Dust scattering, absorption, optical constants, and refractive indices are discussed. The optical constant and refractive index of soot are calculated; based on this data, the absorption coefficient, scattering coefficient, and total absorption coefficient of particulates were calculated applying Mie's theory and using a computer. Results are shown in graphs. Single scattering, single absorption, multiple scattering, and multiple absorption are also discussed. Optical nature, optical constant, scattering coefficient, and absorption coefficient of dust will be studied further.

**28930** **APTIC NO. 50853**

Matsui, Masataka

PROBLEMS OF CITY TRANSPORTATION SYSTEM FROM THE STANDPOINTS OF RESOURCES AND ENVIRONMENTAL PROTECTION. *(Shigen oyobi kankyo hozen no men kara mita toshi kotsu shisutemu shomondai). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Tokyo, p. 91-104, 1973. (Presented at the Japan Society of Mechanical Engineers, Symposium on Energy Supply, 378th, Tokyo, Japan, April 19-20, 1973, Paper 8.)*

Energy consumption and the emission of pollutants by automobiles and city mass transportation are discussed. Increased mass transportation and walking would reduce environmental pollution. Emissions of carbon monoxide, hydrocarbons, and nitrogen oxides by gasoline and liquefied petroleum gasoline engines are listed.

**28931** **APTIC NO. 50434**

Mori, Hiroaki

AIR POLLUTION IN THE TOKYO BAY AREA AS SEEN IN PHOTOCHEMICAL REACTIONS. *(Tokyowan chiiki ni okeru kokagaku hanno ni miru taiki osen). Text in Japanese. Sangyo to Kankyo (Ind. Environ.), 2(4):34-42, March 1973.*

The emergency level for Tokyo (above 0.15 ppm/hr of nitrogen oxides) was exceeded 15 days in 1967, 14 days in 1968, 9 days in 1969, and 19 days in 1970. The annual hourly maximums were 0.22 ppm, 0.22 ppm, 0.27 ppm, and 0.34 ppm, respectively. More warnings were issued in 1971 and 1972, due to an increase in the number of monitoring stations in Japan. A special survey on photochemical reactions was conducted along Tokyo Bay by meteorological survey, airplane survey, smog chamber tests, source testing, and physical checkups on schoolchildren and outdoor workers from July 18 to Aug. 18, 1972. Fourteen warnings occurred during this period. Pollution concentrations were low at night, began to rise at 9 am, and were maximum at 12-1 pm. Pollutant concentrations were evenly distributed except near highways, which had higher concentrations when traffic was heavy.

**28932** **APTIC NO. 50878**

Moriguchi, Minoru

ATMOSPHERIC DISPERSION OF STACK EFFLUENTS. *(Taiki chu ni okeru baien no kakusan). Text in Japanese. PPM (Japan), 4(4):42-57, April 1973.*

Physical and chemical characteristics of stack effluents are described. Gas plume types and the effects of meteorological factors are discussed in relationship to diffusion. Plume types include looping, coning, fanning, lofting, fumigation, and trapping. The effects of buildings and topography on diffusion are also noted. Atmospheric stability in terms of the vertical gradient of ambient temperature is an important factor in diffusion. The vertical temperature variation and the dry adiabatic lapse rate are useful for predicting gas plume types. The effect of wind speed on pollution concentration is discussed. Variation in wind speed with height is explained. The role of atmospheric turbulence and wind direction are also given. Diffusion equations and evaluation of effective stack height are also discussed.

**28933** **APTIC NO. 50454**

Nakano, Michio, Kiyohide Takeuchi, Yasushi Mitsuda, and Tatsuo Hanabusa

THE NATURE OF ATMOSPHERIC TURBULENCE OVER A CITY. *(Toshi joku no taiki no midare no seishitsu ni tsuite). Text in Japanese. Preprint, Japan Architectural Inst., Tokyo, p. 1-9, 1973. 2 refs. (Presented at the Symposium on the Urban Construction and Weather, 3rd Tokyo, Japan, March 9-10, 1973.)*

Atmospheric turbulence, wind speed, and temperature were measured from a 120-meter high tower in Osaka with an anemometer. Mathematical formulas and data analysis were used to calculate eddy diffusion momentum transport, vertical wind speed and temperature distributions, and other meteorological factors contributing to turbulence.

**28934** **APTIC NO. 50992**

Richards, J. M.

THE STABILITY OF WET AND DRY BENT-OVER PLUMES. *J. Appl. Meteorology, 12(1):133-139, Feb. 1973. 12 refs.*

The theory of the stability of wet and dry bent-over plumes is reviewed. Criteria which determine whether a plume will rise to an equilibrium level, or continue to rise indefinitely are discussed. Three forms of plume behavior are distinguished: a plume is stable when it tends ultimately to oscillate in the vertical about an equilibrium level; neutrally stable when such oscillations are only marginally impossible; and otherwise unstable. In the last two cases the plume would, if rising with positive bouyancy, continue to rise indefinitely; thus it is necessary to correctly predict the stable condition of the plume. Criteria for separating these cases were examined in the framework of ideal gas laws, adiabatic thermodynamics, the law of partial pressures, the theory of internal gravity waves, and experimental evidence. The momentum integral equation, the effect of the lapse rate, and conservation of heat are discussed. Mathematical estimations are presented.

**28935** **APTIC NO. 50888**

Sato, Yasuhito

A FIELD SURVEY OF PHOTOCHEMICAL SMOGS. *(Kokagaku sumoggu ni kansuru rifudo sabe). Text in Japanese. In: A Progress Report on Public Nuisance Researches, No. 2: Basic Medical Experiments Concerning Photochemical Smogs. (Kogai kenkyu chukan hokoku, No. 2: Kokagaku sumoggu ni kansuru kiso igakuteki jikkenteki kenkyu). Tokyo Metropolitan Government (Japan), Inst. of Hygiene, p. 28-31, March 1973.*

Various factors contributing toward the fluctuation of oxidant level in a school environment were examined. The factors examined were: the opening and closing of the windows; the location of the classroom; the effects of the curtains; the height of the classroom and the building; and the location of the playground. With the windows closed, the oxidant concentration in the room could be lowered considerably. The curtains contributed to the interruption of the air currents rather than to oxidant decomposition. The height and the location of the classroom or the building were very susceptible to the changes by the wind, sunshine, and adjacent buildings. The findings confirmed that oxidant concentration easily and locally fluctuates by the slightest change of factors. Some samplings were taken in the same school environment to see the range of acrolein concentrations. Concentrated samplings were identified and quantitated by gas chromatography. The average concentration of acrolein was 17 ppb, 74 ppb maximum. But hourly samplings showed a high rate of fluctuation and seemed to have a high correlation with humidity.

**28936** **APTIC NO. 50835**

Shaffer, Wilson A.

ATMOSPHERIC DIFFUSION OF RADON IN A TIME-HEIGHT REGIME. *Drexel Univ., Philadelphia, Pa., Dept. of Physics, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1973, 111p. 31 refs.*

Radon gas concentration, wind speed and direction, and temperature measurements from a 1000-foot tower were used to study the time and height dependence of atmospheric diffusion. Monthly averages of hourly radon measurements, temperature, and wind speed showed a distinct diurnal variation with height. Phase lags and amplitude variations predicted by solutions of the diffusion equation were in poor agreement with the values measured using radon. A minimum value for the flux of radon through the ground at the tower site was determined at 1.0 times 10 to the -16th power Ci/sq cm/sec by using conservation techniques. Values of the diffusion constant as a function of time and height were obtained using this flux and measured values of radon concentration. Correlation studies on a large set of time dependent radon data indicated that the temperature difference between the ground and a given level was the best single indicator of turbulent mixing in the lower atmosphere. (Author abstract modified)

**28937** **APTIC NO. 50819**

Wayne, Lowell G., Allan Kokin, and Melvin I. Weisburd

CONTROLLED EVALUATION OF THE REACTIVE ENVIRONMENTAL SIMULATION MODEL (REM). VOLUME I. FINAL REPORT. *Pacific Environmental Services, Inc., Santa Monica, Calif., Environmental Protection Agency, Office of Research and Monitoring Contract 6[illegible]2-0345, EPA-R4-73-0[illegible]3a, 173p., Feb. 1973. 8 refs.*

NTIS: P[illegible] 220456

The development and validation of an operational version of the Reactive Environmental Simulation Model (REM) was completed. The REM was designed to handle large photochemical mechanisms to assess the impact on air quality of air pollution control devices, fuels, propulsion systems, stationary sources, and transportation systems where evaluation of emissions, emission constituents, and reaction rates are required. The REM version contains a mechanism involving 32 reactions, 12 accumulating species, and 12 non-accumulating species. Larger or smaller mechanisms can be readily inserted into REM for specified purposes. The system theory REM is based on and its operation are described. The REM contains such features as reverse and forward trajectory routines, automatic and objective interpolation from input emission inventory, meteorological and air quality data bases; a chemical dynamics routine capable of accommodating mechanisms based on elementary chemical reactions; and automatic estimation of mixing depth and solar irradiance based on input of local weather and sun angle data. The REM has a running time which makes it cost-effective for practical use. The REM can be used as an unlimited receptor point model and to chronicle emission inputs contributing to the air quality at any receptor point. Simulation studies were done in irradiation chamber experiments of the propylene-ethane-oxides of nitrogen system, automobile exhaust photooxidation systems, toluene-containing systems (toluene-NOx and toluene-butane-NOx), photooxidation products during ultraviolet irradiation, carbon monoxide photochemical reactions, and complete atmospheric photochemical simulations.

**28938** **APTIC NO. 50730**

Wippermann, F.

THE WIND PROFILE VERY CLOSE TO THE GROUND. *Beitr. Physik Atmosphaere, 46(1):57-63, 1973. 3 refs.*

The wind profile in a planetary boundary layer (steady state, horizontally homogeneous) is logarithmic (or log + linear for the diabatic case) in the nearest neighborhood of the ground. This result is derived without any additional hypothesis but only using the boundary layer equations. Since the stress is not constant with height in the planetary boundary layer, the eddy viscosity km cannot increase linearly with height as required for a constant stress layer. (Author summary modified)

**28939** **APTIC NO. 50756**

Yoshikawa, Akira, Katsuhito Yamaguchi, and Hirohisa Saigusa

GAS STAGNATION IN RECTANGULAR CAVITY (PART 2). *(Chokkaku kyabiti nai gasu no tairyu (2)). Text in Japanese. Kuki Chowa Eisei Kogaku (J. Japan Soc. Heat-*

*ing. Air-Conditioning Sanitary Engrs.), 47(3):1-10, March 1973. 16 refs.*

Gas stagnation characteristics in rectangular cavities were investigated to solve the problems of air pollution by automobile exhaust gas in streets with tall buildings. Simplified physical models were used in which the gas was released from bottom surface of cavities and the air flowed on the top of the cavities. A numerical model was constructed in order to investigate the velocity and gas concentration distributions in the cavities. The model consisted of two parts, with calculated velocity distribution in the cavity and the gas concentration distribution using this velocity distribution. Effects of the effluent gas velocity from the bottom surface on the velocity distribution pattern in cavities are investigated. The effects of effluent gas velocity were significant.

**28940** **APTIC NO. 50455**

Yoshizawa, Shin

EXPERIMENT CONCERNING DIFFUSION OF POLLUTION IN THE NEIGHBORHOOD OF A BUILDING. *(Tatemono kinbo no osenkakusan ni kansuru jikken). Text in Japanese. Preprint, Japan Architectural Inst. Tokyo, p. 17-20, 1973. 5 refs. (Presented at the Symposium on the Urban Construction and Weather, 3rd, Tokyo, Japan, March 9-10, 1973.)*

The affect of local pollution on a neighboring building is discussed using a hypothetical volume or space theory. A hypothetical space with a certain volume is assumed to be formed on a given side of a building depending on wind speed, wind direction, building shape, and other surrounding conditions. The concentration of pollutants in this hypothetical space is affected by the quantity of pollutants, in-flow quantity, and ventilation volume which is influenced by wind direction and speed. The theory was checked with a wind tunnel experiment and found to be valid. Carbon monoxide was measured around a particular building while the number of automobiles passing in the street in front of the building was counted. This data, combined with wind speed and direction data, was used to predict diffusion and pollutant concentrations in the hypothetical space of the building.

**28941** **APTIC NO. 50682**

Zimen, K. E. and F. K. Altenhein

THE FUTURE BURDEN OF INDUSTRIAL CO2 ON THE ATMOSPHERE AND THE OCEANS. *Naturwissenschaften (Berlin), 60(4):198-199, 1973. 10 refs.*

For determining the impact of industrial carbon dioxide on the CO2 content of the atmosphere and the sea, a three-box model was used as a first approximation. Nearly all fossil CO2 is eventually transferred to the deep ocean. The time function for the surplus CO2 in the atmosphere and in the mixed surface sea during the period of transition to a new steady state is considered over a longer period than to the year 2000. The finiteness of the fossil fuel resources is taken into account by using the logistic curve by Verhulst. A computer program was devised for calculating the surplus of CO2 in the atmosphere, the mixed surface sea, and the deep sea using differential equations for the exchange coefficients in the three-box model with an input of CO2 governed by the logistic function. During the next 100 years the effective growth factor will fall from its present value of 4.5% to 1%/yr. The input rate will thus rise steeply from its present value to a maximum, declining towards the end of the 21st century. The input of industrial CO2 will raise the CO2 concentration in the atmosphere from its present value of 320 ppm to 370 ppm by the end of this century and will double it in about 100 years from now.

## 1972

**28942** **APTIC NO. 50769**

Akiyama, Jutaro, Seiyo Uchiyama, Isao Takahashi, and Kazuo Kaneda

AIR POLLUTION IN SHIBUKAWA DISTRICT. NO 2. THE RELATION BETWEEN HYDROGEN CHLORIDE CONCENTRATION AND CLIMATE. *(Shibukawa-chiku ni okeru taiki osen. Dai niho. Enkasuiso nodo to kisho tono kankei). Text in Japanese. Gunma-ken Eisei Kenkyusho, Gunma-ken Kogai Kenkyu Center Nenpo (Ann. Rep. Gunma Inst. Pub. Health Gunma Res. Center Environ. Sci.), no. 4:111-112, Aug. 1972. 1 ref.*

The relationship between hydrogen chloride concentration in the atmosphere around two factories and wind direction was investigated. The HCl concentration was rather low in the area between the factories but was high elsewhere, irrespective of wind direction. No relation, therefore, was determined.

**28943** **APTIC NO. 50687**

Bartels, Hella and Hartmut Scharrer

DIFFERENCES IN CIRCULATION AND TEMPERATURE DURING SELECTED WEATHER CONDITIONS AT SPECIAL PERIODS DAY AND NIGHT ON THE BASIS OF MEASUREMENTS TAKEN BY THE TEMPORARY STATION NETWORK OF THE GERMAN METEOROLOGICAL SERVICE. *In: Lufthygienisch-meteorologische Modelluntersuchung in der Region Untermain. 4. Arbeitsbericht. Regionale Planungsgemeinschaft Untermain, Frankfurt am Main (West Germany), p. 31-44, Oct. 1972. 7 refs.*

Meteorological conditions in the Rhein-Main area are described. Wind distributions were measured during a case of high pressure with its center over Central Europe and in a cyclonic west wind situation. Temperature distributions were studied throughout the day, over different areas, during a high pressure situation, and during a cyclonic west wind situation. Homogenous wind fields were formed in an advective weather situation, for which the Bremen Model according to Fortak can be used. A leveling of temperature at all stations occurred during this situation. During high pressure, almost homogenous wind fields were formed which flow into the Frankfurt area, due to the Taunus valley. This airing of the town is important for both settlement and regional planning problems. The same is true of the Kinzig valley area at the foot hills of the Spessart. An investigation is needed to determine whether the wind distribution shows a statistically significant non-prevalence direction or a prevailing direction in the regions surrounding Frankfurt so a diffusion model could be used. Several stations with similar characteristics could be grouped together. (Author conclusions modified)

**28944** **APTIC NO. 50656**

Changnon, Stanley A., Jr., Richard G. Semonin, and William P. Lowry

RESULTS FROM METROMEX. *Preprint, American Meteorological Society, Boston, Mass., p. 191-197, 1972. 18 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)*

The Metropolitan Meteorological Experiment (Metromex) was initiated in St. Louis involving laboratory and atmospheric modeling projects. The goals of the project are to assess the effects of a major urban-industrial complex on precipitation, and to determine the quantitative changes in surface precipitation. The groups organization and their facilities are described as well as the results of their early experiments. Measurement techniques are described. Aerosol concentration materially alters the microphysical structure of clouds, and urban aerosol can be processed through a cloud system in sufficient time to be observed in the climatologically defined maximum rainfall area. Raincell analysis of all available data indicated that an urban area significantly effects the intensity, duration, velocity, and area of precipitating clouds.

**28945** **APTIC NO. 50657**

Changnon, Stanley A., Jr.

URBAN EFFECTS ON THUNDERSTORM AND HAILSTORM FREQUENCIES. *Preprint, American Meteorological Society, Boston, Mass., p. 177-184, 1972. 8 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)*

The effects of aerosols, heat, moisture, and mechanical turbulence on convective processes over and immediately downwind of urban-industrial areas were investigated. Historical (1901-1969) thunder-day and hail-day records for regions in and around eight cities were used to establish the existence of alterations in their frequencies, and to identify the causes. The cities investigated included Chicago, Indianapolis, St. Louis, Cleveland, Washington, D. C., Tulsa, Houston, and New Orleans. The investigation was based on all available Weather Bureau station records in and within 60 mi of each city. The basic analytical approach involved both spatial and temporal analyses of the frequencies of the events. The data, the changes (increase) found in each city, the geographical distributions of the areas with the increases, the periods when the increases began, and the possible relationships of the increase to various synoptic conditions and urban factors were evaluated. Thunder and hail-day frequency increases were found in the six largest cities investigated. The results suggested that a critical size of urban area (over 900,000 population) must be reached before an urban area can affect severe storm frequency. The results also suggested that local increases in thunder frequencies will increase 30% as the city population exceeds 3 million.

**28946** **APTIC NO. 50672**

Eimutis, E. C. and M. G. Konicek

DERIVATIONS OF CONTINUOUS FUNCTIONS FOR THE LATERAL AND VERTICAL ATMOSPHERIC DISPERSION COEFFICIENTS. *Atmos. Environ., 6(11): 859-863, Nov. 1972. 12 refs.*

Multistage regression techniques were used to derive atmospheric class continuous functions and distance continuous functions for the lateral and vertical atmospheric dispersion coefficients. Standard deviation of wind direction fluctuation and the lapse rate were used as the basic independent variables. All the regression equations were highly significant at the 95% confidence level. (Author abstract modified)

**28947** **APTIC NO. 50636**

Hirt, C. W. and J. L. Cook

CALCULATING THREE-DIMENSIONAL FLOWS AROUND STRUCTURES AND OVER ROUGH TERRAIN. *J. Comput. Phys., 10(2):324-340, Oct. 1972. 13 refs.*

A computing technique for low-speed fluid dynamics was developed for the calculation of three-dimensional flows in the vicinity of one or more block-type structures. The full time-dependent Navier-Stokes equations were solved with a finite-difference scheme based on the Marker-and-Cell method. Effects of thermal buoyancy were included in the Boussinesq approximation. Marker particles that convect with the flow can be used to generate streaklines for flow visualization, or they can diffuse while convecting to represent the dispersion by turbulence of particulate matter. The data resulting from these calculations were rendered more intelligible by perspective-view and stereo-view plots of selected velocity and marker-particle distributions. (Author abstract)

**28948** **APTIC NO. 50460**

Kerin, Zarka and Danimir Kerin

THE POLLUTION OF NATURAL WATER BY INDUSTRIAL LEAD EMISSIONS. *(Die Beeintrachtigung natuerlicher Gewaesser durch die industrielle Bleiimmissionen). Text in German. Preprint, 7p., 1972. 8 refs. (Presented at the International Convention on Civilization Diseases, Nutrition, Environment and Living Conditions, 18th, Berlin, West Germany, Sept. 16-23, 1972.)*

The pollution of drinking water and river water by industrial lead emissions was determined. Water samples were taken from fountains, wells, taps, surface water, and rain in the contaminated area of Mezica, Yugoslavia. For comparison, drinking water and surface water samples were taken in an unpolluted area. The drinking water in the lead contaminated area had no higher lead concentration than that in the non-polluted area. The concentrations were in all cases smaller than the maximum allowable concentration of 50 micrograms/l recommended by the WHO. The rivers in the vicinity of the lead plant, but still ahead of the entry of the plant's waste water, measured lead concentrations of 12.0 to 20.38 micrograms/l. In areas remote from the lead plant, the rivers measured lead concentrations of 0.20 micrograms/l to 7.0 micrograms/l. After entry of the waste water from flotation of lead ores, the concentration jumped to 700.000 micrograms/l. At 22 km from the lead plant, this concentration was down to 3000 micrograms/l. Pre-industrial concentrations of surface and well water are estimated to have amounted to 0.01 to 0.02 micrograms/l. Lead in rainwater has 2.97 micrograms/l.

**28949** **APTIC NO. 50689**

Link, A. and R. S. Kaller

COMPARISON OF WIND DIRECTION, WIND VELOCITY AND SO2-CONCENTRATION DISTRIBUTIONS FOR A PERIOD OF SEVERAL YEARS AND FOR SELECTED PERIODS TO BE USED IN A DISPERSION MODEL FOR THE FRANKFURT REGION. *In: Lufthygienisch-meteorologische Modelluntersuchung in der Region Untermain. 4. Arbeitsbericht. Regionale Planungsgemeinschaft Untermain, Frankfurt am Main (West Germany), p. 52-60, Oct. 1972. 5 refs.*

Wind direction, wind velocity, and atmospheric stability are used to determine ground level emission concentrations with a dispersion model. In the first model, a homogenous wind field is required for calculation with a constant wind direction and velocity for a certain weather situation. In Frankfurt, the ground level emission concentrations of 20% of the annual weather situations can be computed with this model. Even in weather situations where a relatively homogenous wind field should be expected, differences of wind distribution can occur. The measured concentrations are lower than the concentration when considering the total collective situations. For one measuring point in the inner city, the highest emission loads with the total collective occur the southwest winds, and the load reaches its maximum at northwest winds, and the load reaches its maximum at northwest winds with the homogenous wind field. To compute representative emission loads for the Frankfurt area, an extension of the model to inhomogenous wind fields is necessary. The necessary wind data for this can be obtained using the German Weather Service climate stations. (Author conclusions modified)

**28950** **APTIC NO. 50821**

Martinez, Jose R.

USER'S GUIDE TO DIFFUSION/KINETICS (DIFKIN) CODE. *General Research Corp., Santa Barbara, Calif., Environmental Protection Agency Contract 68-02-0336, EPA-R4-73-012, Vol. b, CR-2-273, 72p., Oct. 1972. 1 ref.*

NTIS: PB 220243

Instructions for using the computer code developed for the photochemical smog/diffusion simulation model are presented.

Code features are described, and instructions are provided regarding certain modifications of the code. The DIFKIN code is written in FORTRAN IV compatible with the IBM 360 system. It is composed of a main program and 25 sub-programs. A list of the sub-programs and a brief description of the function of each is provided. the code operates in single-precision mode and requires approximately 16,000 words of core storage for execution.

**28951** **APTIC NO. 50642**

Miller, John Milton

A MODEL FOR THE RAINOUT AND WASHOUT OF SULFATES IN THE ATMOSPHERE. *Pennsylvania State Univ., University Park, Dept. of Physics, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., March 1972, 115p. 72 refs.*

The rainout and washout of sulfur dioxide in the atmosphere was described by the use of a set of chemical reactions. From this set of chemical equations a model was developed which predicts the sulfate formed in the rainwater collected at the ground. The scavenging of sulfate particles was added to the model. A comparison was made between the amount of sulfate formed by the absorbed gas and the collected sulfate particles in the raindrop. Experimental and theoretical results indicated that the amount of sulfate in the rainwater predicted by the model compared well with the actual measurements of sulfate collected in rainwater. The model, equations, and experiments are described in detail.

**28952** **APTIC NO. 50857**

Motschka, O. and K. Zimmermann

THE CONSTRUCTION OF A RECORDER INSTALLATION FOR THE DETERMINATION OF THE VERTICAL WIND PROFILE. *(Der Aufbau einer Registrieranlage zur Bestimmung des vertikalen Windprofils). Text in German. Arch. Meteorol. Geophys. Bioklimatol, Ser. B, 20(3-4),345-352, 1972. 5 refs.*

A 6V/1.2W lamp of 5 mm diameter and 20 mm length, as well as photo diode of 2 mm diameter and 12 mm length were installed into an anemometer. The photo diode controlled a transistor which serves as an impendance converter for an integrated circuit with two NAND gates. The two gates are responsible for releasing a counting impulse of 50 ms.

**28953** **APTIC NO. 50445**

Sakabe, Hiroyuki, Katsunori Homma, and Tetsuo Ishida

ELECTRON MICROSCOPIC STUDY OF PARTICULATE AIR POLLUTANTS. *(Ryushi-jo taiki osen busshitsu no denken-teki kenkyu). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 108. (Nov. 7-9, Paper 63.)*

The particle shapes and chemical composition of photochemical smog were examined by electron microscopy. The shapes and compositions were extremely different from the conventional type of particulates. The pollutant samplings collected in Yokkaichi in 1964 and in Kawasaki in 1970 were mostly composed of carbon and other solid and separate particles, and grease particles were sometimes combined with these elements. The particulates sampled in Kawasaki in the summers of 1971 and 1972 were solids on the days of relatively low temperature and humidity and northerly wind; but when the temperature and humidity were high and the wind was southerly, the major part of particles were grease which had a strong corrosive effect on the copper film on which they were collected. Especially on June 11, 1972, when 102 people felt eye irritation and other effects of photochemical smog, the particulate samplings consisted almost entirely of grease, and the corrosive reaction on copper film was very strong. These observations may offer some hints to the studies of photochemical smog, which is usually considered a gaseous material.

**28954** **APTIC NO. 50822**

Sholtes, R. S.

THE GROWTH AND DECAY OF TURBULENT MIXING IN THE PLANETARY BOUNDARY LAYER. *Florida Univ., Gainesville, Environmental Protection Agency, Office of Research and Monitoring Contract EHSD 71-40, Program Element 1A1009, EPA-R4-72-001, 98p., April 1972. 5 refs.*

NTIS: PB 220343

The development and collapse of mixing layers with particular emphasis upon the latter using aircraft motion due to air turbulence as the primary measured quantity are examined. Variations in this process which might be attributed to cloud cover, urbanization, wind patterns, and other meteorological parameters were sought. Data were collected in several meteorological patterns in Atlanta and Gainesville, Florida. Atmospheric turbulence as measured by the turbulence indicator undergoes an orderly buildup during the morning and early afternoon hours and experiences a rapid decay throughout its active height in the hours preceding sunset. Turbulent mixing height as measured with an aircraft yaw accelerometer system also experiences an orderly buildup to a maximum and with the approach of sunset undergoes a rapid collapse and might be better described as rapidly losing its identity insofar as defining an upper limit. The total turbulent energy within the mixing height attains a maximum level at a time prior to the attainment of a maximum in turbulent mixing height or surface temperature. During the period of decay or collapse in turbulence and turbulent mixing height, there is a trend in the lapse rate toward a more stable condition, however, not in proportion to the total decay or collapse in mixing. (Author conclusions modified)

**28955** **APTIC NO. 50812**

Smith, Paul Elwood

THE EFFECTS OF SOME AIR POLLUTANTS AND METEOROLOGICAL CONDITIONS ON AIRBORNE ALGAE AND PROTOZOA. *North Carolina State Univ., Raleigh, N. C., Botany Dept., Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1972, 72p. 96 refs.*

The occurrence of microorganisms over a broad geographical area and the use of these organisms as biological indicators of air pollutants was investigated. The dispersal of viable airborne algae and protozoa in the atmosphere and the effect of meteorological conditions and air pollutants on these organisms were studied. The meteorological parameters included temperature, solar radiation, barometric pressure, dewpoint, wind speed and direction, and rainfall. Of the air pollutants measured, only particulate matter was correlated with the number of organisms. The total sulfur and hydrocarbon concentrations averaged 0.016 and 1.2 ppm, respectively, for the entire year. The survival of algae and protozoa in the atmosphere depended on the meteorological condition and the interrelationships between the physical and chemical characters of the various air masses.

**28956** **APTIC NO. 50836**

Wolsko, Thomas D., Michael T. Matthies, and Richard F. King

A METHODOLOGY FOR CONTROLLING AIR POLLUTION EPISODES. *Argonne National Lab., Ill., Center for Environmental Studies, Environmental Protection Agency Interagency Agreement EPA-IAG-0025(R), Rept ANL/ES-14, 205p. Sept. 1972. 14 refs.*

NTIS: ANL/ES-14

A methodology for developing effective, preplanned emission control strategies for urban air pollution episodes is examined. A steady-state Gaussian dispersion model was applied to known emission inventories for various sets of meteorological conditions that are liable to exist during episodes. Calculated pollution contours were plotted directly on 35 mm film for projection into a larger display format that is convenient for identifying episode problems and planning control strategies. A hypothetical episode was used to illustrate techniques, using Chicago area measurements as test data. The meteorological data included measurements of mixing height, wind speed and direction, stability conditions, and seasonal temperatures. Computer programs used and the technology are included. Although the procedures were designed to control sulfur dioxide and particulate matter, they are applicable for any non-reacting/airborne pollutant. (Author abstract modified)

## 1970

**28957** **APTIC NO. 50825**

Wayne, Lowell G., Robert J. Bryan, Mel Weisburd, and Roy Danchick

COMPREHENSIVE TECHNICAL REPORT ON ALL ATMOSPHERIC CONTAMINANTS ASSOCIATED WITH PHOTOCHEMICAL AIR POLLUTION. *System Development Corp., Santa Monica, Calif., National Air Pollution Control Administration Contract CPA 22-69-108, TM-(L)-4411/002/01, 513p., June 1970. 279 refs.*

A comprehensive technical report on all atmospheric contaminants associated with photochemical air pollution is presented. The inter-relationships of contaminants, environmental, and source factors involved in the total photochemical-environmental appraisal were generalized for possible application to various regions where photochemical smog presents a problem. Illustrative applications of techniques for appraising air quality and predicting its trends are analyzed, including: multivariate statistical analysis of information obtained from air monitoring, and simulation modeling for studying future interactions of reactive contaminants. The photochemical air pollution complex is described, and the phenomenology of photochemical smog is reviewed. Sources, principles of control, the nature of photochemical reactants, atmospheric physics and meteorology, atmospheric reactions, air quality appraisal, and a multivariate analyses of air quality and environmental data are reviewed. A digital simulation of photochemical pollution, and a mathematical description of the model are also presented. The reactions of hydrocarbons, nitrogen oxides oxidants, sulfur oxides carbon monoxide, peroxyacetyl nitrate, and particulates are mentioned.

# BASIC SCIENCE AND TECHNOLOGY

## 1973

**28958** **APTIC NO. 51023**

Bett, J., K. Kinoshita, K. Routsis, and P. Stonehart

A COMPARISON OF GAS-PHASE AND ELECTROCHEMICAL MEASUREMENTS FOR CHEMISORBED CARBON MONOXIDE AND HYDROGEN ON PLATINUM CRYSTALLITES. *J. Catalysis, 29(1):160-168, April 1973. 19 refs.*

Hydrogen and carbon monoxide chemisorptions were measured by gas-phase and electrochemical method s for platinum dispersed on carbon supports. At both the liquid and gas-phase interfaces, the stoichiometrics of the chemisorptions were similar; the ratio of hydrogen atoms to surface platinum atoms was close to unity, and the ratio of carbon monoxide molecules to hydrogen atoms absorbed lay between 0.8 and 1.0 for platinum crystallites up to 200 Angstrom in dia. In gas-phase measurements, the catalyst pretreatment conditions were carefully controlled to avoid poisoning of the platinum surface. The effectiveness of high anodic potentials in cleaning poisons from the platinum surface made the electrochemical measurement an attractive complementary technique for the study of platinum supported on carbon. (Author abstract)

**28959** **APTIC NO. 50714**

Bosco, George F., Michael Matteson, and Othmar Preining

PROPERTIES OF FINE CONDENSATION AEROSOLS. *(Eigenschaften feinteiliger Kondensationsaerosole). Text in German. Staub, Reinhaltung Luft, 33(4):163-166, April 1973. 10 refs.*

In the production of fine particle condensation aerosols a metastable state is created by cooling an oversaturated vapor. The so-called clusters are then formed which, from a critical magnitude on, become static. They grow by the addition of a molecule or by accumulation of many clusters. If this accumulation occurs, the density increases. By comparing the Stokes diameters and the geometrical diameters it has been possible to confirm this difference between densities.

**28960** **APTIC NO. 51013**

Bryant, James T.

POWDERED FUEL COMBUSTION: MECHANISM AND PARTICLE SIZE. *Combustion Flame, 20(1):138-139, Feb. 1973. 9 refs.*

The agglomeration of fine particles indicates that very coherent aggregates as large as 40 micron in diameter are common even when the diameter of the basic units is a few micron or smaller. The size of the aggregates depends on both the nature of the material and the combustion environment. An illustration of the ambiguity in apparent particle size is illustrated, where the measured mean particle diameter of a boron carbide powder is plotted against the gas pressure with which it had been injected into a micromerograph particle size analyzer. The severity of injection has a pronounced influence on the apparent particle agglomerate size. This behavior is common to all the fine powders of carbon, aluminum, boron, and boron carbide. The strong tendency of small particles to form aggregates may result in anomalously long burning times even in the absence of definite coherent agglomerates.

**28961** **APTIC NO. 50839**

Ettinger, Harry J., Charles I. Fairchild, Lawrence W. Ortiz, and Marvin I. Tillery

AEROSOL RESEARCH AND DEVELOPMENT RELATED TO HEALTH HAZARD ANALYSIS. QUARTERLY REPORT - JULY 1 THROUGH DECEMBER 31, 1972. *Los Alamos Scientific Lab., N. Mex., Aerosol Studies Section, National Inst. for Occupational Safety and Health Proj. R-072, LA-5182-PR, 34p., Feb. 1973. 8 refs.*

Final development and documentation of the dispersion filtration technique for the preparation of asbestos standard filter samples was completed. Quality control monitoring of these samples indicated the magnitude of variations in fiber count which may be expected. Work to generate fibrous glass aerosols for calibration of the 10 mm cyclone was reactivated. Sampling at 1.7 lpm, these cyclones exhibited a well defined aerodynamic cut off for fibers greater than 2.2 micron in diameter. The system developed to provide a coal dust aerosol for the testing of coal mine personal samplers was also completed. Coal grinding experiments established a relationship between grinding conditions and product specific surface. Using these as a guide, air dispersed dusts appeared to have predictable aerodynamic size characteristics. Initial studies with the spiral centrifugal aerosol spectrometer indicated increases in aerodynamic diameter of as much as 30% for submicron polystyrene latex particles under high humidity conditions. Subsequent experiments using a horizontal elutriator indicated no effect when the temperature was kept constant throughout the experimental apparatus. Reevaluation of the spiral experiments indicated that the change was the result of water condensation on the polystyrene particles caused by a decrease in temperature during sampling. (Author abstract)

**28962** **APTIC NO. 51020**

*Fenner, Wayne R., Howard A. Hyatt, John M. Kellam, and S. P. S. Porto*

*RAMAN CROSS SECTION OF SOME SIMPLE GASES. J. Opt. Soc. Am., 63(1):73-77, Jan. 1973. 12 refs.*

The differential Raman cross sections of the main Raman-active vibrations were measured in the gases nitrogen dioxide, oxygen, hydrogen, carbon monoxide, nitric oxide, carbon dioxide, sulfur dioxide, nitrous oxide, hydrogen sulfide, ammonia, nitrogen triduterium, methane, ethane, and benzene using 488.0-nm laser light. The results were compared with previous measurements made at other wavelengths. The Raman cross sections of the rotational lines in the diatomic gases were also measured, as were the vibrational-rotational lines of $O_2$ and $N_2$. Absolute measurements of the Raman cross sections were performed by calibrating the Raman spectrometer, and by comparing the unknown against liquid benzene. Results of these measurements compare reasonably well with previous determinations for which corrections for the ν4 frequency dependence were made. The experimental details, pertinent properties of molecules studied, and ratios of Raman cross sections of various vibrational lines are given. (Author abstract modified)

**28963** **APTIC NO. 50725**

Fuchs, N. A., F. I. Muraschkevich, and A. D. Raikhin

STUDY OF THE EFFICIENCY OF THE IMPACTION OF DUST PARTICLES ON WATER DROPLETS. *(Vorlaeufige Mitteilung ueber die Wirksamkeit von Zusammenstoessen zwischen Staubteilchen und Wassertropfen). Text in German. Staub, Reinhaltung Luft, 33(4):177-178, April 1973. 4 refs.*

An air jet containing quartz, corundum, or coal particles with size 5 to 80 micron impinges with a velocity 1 to 6 m/sec on a stationary water drop; the collision between the particles and the drop are studied both visually and photographically. Apparently, almost all collisions are efficient. The particles captured remain on the surface of drops of pure water but penetrate into drops of an aqueous solution of a surfactant.

**28964** **APTIC NO. 50711**

Guichard, J. C.

THE STATIC ELECTRICITY OF METAL PARTICLE AEROSOLS GENERATED BY A FLUIDIZED BED OF TWO COMPONENTS. *(La triboelectrisation des aerosols de particules metalliques generes par un lit fluidise a deux constituants). Text in French. Staub, Reinhaltung Luft, 33(4):169-174, April 1973. 5 refs.*

Aerosols can be generated from a fluidized bed. They have a constant and reproducible electric charge. The triboelectric properties of the particulate clouds were investigated. Electrostatic behavior in the fluidized beds appears clearly when the container and the bed are both metallic. The metallic aerosols emitted by the fluidized bed generator were investigated with a mobility analyzer. Examples of charge distributions are given.

**28965** **APTIC NO. 50900**

Homer, J. B. and M. M. Sutton

NITRIC OXIDE FORMATION AND RADICAL OVERSHOOT IN PREMIXED HYDROGEN FLAMES. *Combustion Flame, 20(1):71-76, Feb. 1973. 16 refs.*

Profiles of nitric oxide concentration in atmospheric-pressure, premixed, and hydrogen-oxygen-nitrogen flames were measured by flame gas sampling and Saltzman analysis, and a mathematical model which describes the chemistry of the burned-gas region of these flames was used to match the profiles observed. A significant part of the nitric oxide was formed very early in the flame as a result of the overshoot of oxygen atom concentration above the equilibrium level. The results also implied a rapid relaxation of the radical overshoot, and the kinetic model was developed to include a dominating radical recombination route through water. (Author abstract modified)

**28966** **APTIC NO. 50385**

Hoshika, Yasuyuki

SEVERAL REACTIONS OF OFFENSIVE SUBSTANCES IN THE ATMOSPHERE. PART II. PHOTOCHEMICAL REACTIONS BY FIVE OFFENSIVE ODOR SUBSTANCES AND RELATED SUBSTANCES. *(Akushu busshitsu no taikichu ni okeru shohanno. (sono II)- Akushu 5 buasshitsu narabini kanren busshitsu no kokagaku hanno). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 9(3):285-291, March 1973. 45 refs.*

Photochemical reactions of ammonia, amines, hydrogen sulfide, and organic sulfur compounds are described. The absorption spectrums of ammonia, amines, $H_2S$ hydrocarbons, and photochemical reactions are given.

**28967** **APTIC NO. 50717**

Ke, P. J. and R. J. Thibert

KINETIC MICRODETERMINATION OF MERCURY IN NATURAL WATERS AND BIOLOGICAL MATERIALS. *Microchim. Acta, no. 3:417-427, 1973. 39 refs.*

A wet digestion has been developed to prepare water and biological samples for a kinetic determination of mercury using an iodide-catalyzed reaction between cerium(IV) and arsenite(III) and spectrophotometry. A mercury-free control, prepared using ion-exchange with a selective chelating resin, was used by adding mercury standards to make a calibration curve. Both inorganic and organic mercury can be determined by the method described either in water or biological samples containing mercury in the range of 0.05 to 2.0 micrograms/ml. The procedure can be used satisfactorily down to the 0.05-ppm level for fresh water and urine with an overall error of less than 5%. The method can also be employed for the determination of mercury in sea water or blood serum with an error of 10% or Less and gives results which compare favorably with other procedures.

**28968** **APTIC NO. 50809**

Kessler, T., A. G. Sharkey, Jr., and R. A. Friedel

ANALYSIS OF TRACE ELEMENTS IN COAL BY SPARK-SOURCE MASS SPECTROMETRY. *Bureau of Mines, Pittsburgh, Pa., Pittsburgh Energy Research Center, RI 7714, 11p., March 1973. 6 refs.*

As part of a respirable mine-dust research program at the U. S. Bureau of Mines, spark-source mass spectrometry was used for the semi-quantitative determination of trace elements (200 ppm weight or less) in raw coals. In addition, several minor and major elements were determined using this technique. Sixty-four elements ranging in concentration from 0.01 to 41,000 ppm weight were determined in one anthracite, two mvb, four lvb, and six hvab raw coal samples. The samples represented 10 coal seams located in Pennsylvania, West Virginia, Virginia, Utah, and Colorado. (Author abstract)

**28969** **APTIC NO. 50997**

Kitagawa, Hiroshi

STUDIES ON PREPARATION OF ACTIVE CARBON FROM COAL. *(Sekitan o genryo to suru kasseitan no seizo ni kansuru kenkyo). Text in Japanese. Kogai (Hakua Shobo) (Pollution Control), 8(2):15-24, March 1973. 37 refs.*

A method for preparing active carbon from bituminous and anthracite coal was investigated. Spherically granulated raw coals were carbonized at 600 C and then activated with steam at 800-900 C for 12 hours. Specific surface area, pore size distribution, equilibrium adsorption isotherms, and adsorption rate of methylene blue and sodium dodecylbenzene sulfonate were measured for active carbon. The specific surface area of active carbon from Ashibetsu coal increased with weight loss. For Natal coal, the specific surface area reached a maximum at about 55% weight loss. Active carbons of high adsorption properties can be prepared from these coals.

**28970** **APTIC NO. 50673**

Kobayashi, M. and T. Shirasaki

THE CHEMISORPTION OF CO ON RUTHENIUM METALS AND RUTHENIUM-SILICA CATALYSTS. *J. Catalysis, 28(2):289-295, Feb. 1973. 12 refs.*

The chemisorption of carbon monoxide on ruthenium metals and supported ruthenium-silica catalysts was studied at 150 C. The Ru metal made by Adam s method adsorbed a normal quantity of CO, agreeing with previous studies. The Ru metal by Willstaetter s method and the supported Ru-SiO2 catalyst adsorbed a large quantity of CO, and the volume decreased by a repetition of adsorption and reduction.

**28971** **APTIC NO. 50829**

Laskey, John W., Jeannie L. Parrish, and Daniel F. Cahill

SOME EFFECTS OF LIFETIME PARENTAL EXPOSURE TO LOW LEVELS OF TRITIUM ON THE F2 GENERATION. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Experimental Biology Lab., 22p., 1973 (?). 19 refs.*

Rats were continuously exposed to constant activities of tritium (HTO) in drinking water from conception of the F1 generation through delivery of the F2 generation. The activities employed were 0.01, 0.10, 1.0 and 10.0 micro Ci HTO/ml of body water which were two to 2000 times the maximum permissible concentration for an individual in the general population. These activities provided whole body dose rates of about 3000 millirads/day. Continuous exposure produced a 30% reduction in the weight of the F1 adult male testes but no impairment of growth or reproductive ability. Statistically significant effects on the F2 neonates were: reductions in relative brain weight at 0.1-10.0 micro Ci/ml; decreased body weight at 1.0 and 10.0 micro Ci/ml; and decreased litter size and increased resorption at 10.0 micro Ci/ml. Analyses of the metabolically-incorporated tritium activities of F1 adult male and F2 neonatal tissues were performed. Maximum tritium levels in tissue from HTO are reached during in utero exposure. Brain and testes contained about 100% and 50% greater tritium activities than the average in other tissues. Comparisons were made with a similar study which employed only intrauterine HTO exposures. These indicated that lifetime parental exposure to low levels of radiation produces effects on the F2 at levels 10-100 times below those required for effect after in utero exposure alone. (Author abstract)

**28972** **APTIC NO. 50496**

Sano, Hiroshi, Katsuji Ishibashi, and Akira Nakajima

THE EFFECT OF EDTA TREATMENT OF A SOLID CATALYST ON THE AIR OXIDATION OF SULFUROUS ACID. *(Aryusan no kuki sanka ni okeru kotai shokubai e no EDTA koka.) Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 693, 1973. (Presented at the Japan Chemical Society, Spring Meeting, 28th, Tokyo, Japan, April 1-5, 1973, Paper 3D03.)*

Changes in the oxidation rate of sulfurous acid were determined over several catalysts treated with ethylenediaminetetraacetic acid(EDTA). Silicate catalysts, activated carbons, and carbide catalysts were washed with EDTA. The rate of oxidation decreased with EDTA treatment, due to shielding of heavy metallic ions by EDTA. The carbon catalysts did not completely lose catalytic activity which suggests the limited contribution of the heavy metallic ions to catalytic oxidation.

**28973** **APTIC NO. 50716**

Straubel, Harald

CONDENSATION, EVAPORATION, CRYSTALLIZATION, AND CHARGE CHANGES OF SOLVENT DROPLETS. *(Kondensation, Verdampfung, Kristallisation und Ladunsaenderung von Loesungstroepfchen) Text in German. (Staub, Reinhaltung Luft, 33(4):174-177, April 1973. 3 refs.*

In a specially developed electric condenser the individual charged particles or droplets can form a free stable suspension which is weighed each time by means of a voltmeter. The diffraction pattern, occurring in the case of illumination by a laser beam, makes possible not only the detection, but also the measurement of the absorption and elimination of water and the crystallization. Since a very accurate optical determination of the size of a droplet of a solution can be carried out by the diffraction pattern formed by it, and since the electrical suspension gives the charge/mass ratio, it is also possible to measure the charge which is evaporated with water during the crystallization. The Method also permits the observation of the gradual oxidation of hydrocarbons and the reduction or adsorption of gases on solid bodies (ammonia on copper sulfate).

**28974** **APTIC NO. 50671**

Takeuchi, Hiroshi, Toshikazu Nagai, and Niichiro Tokura

THE PHOTOCHEMICAL REACTIONS OF TETRAHYDROFURAN ANND TETRAHYDROTHIOPENE WITH SULFUR DIOXIDE. *Bull. Chem. Soc. Japan (Tokyo), 46(2):695-696, Feb. 1973, 10 refs.*

The photochemical products of the reaction of tetrahydrofuran (THF) and tetrahydrothiophene (THT) with sulfur dioxide were studied. A photochemical reaction in the THF-SO2 system yielded di-2-tetrahydrofurylsulfone and 2-tetrahydrofuransulfinic acid which were unstable under atmospheric conditions. In the THT-SO2 photochemical reaction, studied to determine the formation of sulfone or sulfinic acid, only di-2-tetrahydrothiophenylsulfone was obtained in a low yield. The experimental procedures and results are examined.

**28975** **APTIC NO. 50489**

Umland, F., H. F. Voigt, and H. Fechter

THE ROLE OF ALKALI SULFATES DURING THE HIGH TEMPERATURE CORROSION. PART II. *(Die Rolle der Alkalisulfate bei der Hochtemperaturkorrosion Teil II.) Text in German. Werkstoffe Korrosion, 24(3):191-199, March 1973. 24 refs.*

Experimental work on corrosion by sulfur oxides of various nickel base materials (NiCr20 TiAl (Nimonic 80A), NiCr20Co18TiAl (Nimonic 90) and high alloy steels (X40CoCrNi 2020 20 (S 590), X8CrNiNb 16 13 (AISI), X12CrNiWTi 16 13 (17/13W) and pure nickel was undertaken. The action of nickel sulfide results in a heavy intergranular attack, accompanied by metal growth at 650 C., i.e., below the melting point of nickel sulfide. Under the action, the sulfate melts (sodium and potassium sulfates); the formation of nickel sulfide depends on the oxygen content of the atmosphere; with sufficient oxygen present there is practically no sulfide. Addition of sodium chloride to the melt increases the aggressivity of the latter in particular at higher temperature (800 C), and may result in the complete destruction of the metal. Scale layers which may be present have no protective effect when they are porous and thus are not able to resist the penetration of the sulfate to the metal surface. The resistance of the alloy is primarily determined by the nickel content and decreases as the nickel content is increased; with comparable Ni contents, the cobalt contents are an important criterion because Co-containing scales appear to be easily penetrated by sulfates.

**28976** **APTIC NO. 50638**

Westley, Francis

A SUPPLEMENTARY BIBLIOGRAPHY OF KNINETIC DATA ON GAS PHASE REACTIONS OF NITROGEN, OXYGEN, AND NITROGEN OXIDES. (FINAL REPORT). *Nat. Bur. Stand. (U. S.) Spec. Publ., no. 371:1-79, Feb. 1973. 465 refs.*

GPO C13.10:371

A bibliography, a reaction oriented list of references, is provided for published papers and reports containing rate data for reactions of nitrogen, nitrogen oxides, oxygen, and ozone with each other. It includes an extensive list of papers dealing with production reactions of molecular oxygen in exited singlet state. Two lists of critical reviews dealing with the above reactions are also included. The period covered extends from 1900 through January 1972. (Author abstract modified)

**28977** **APTIC NO. 51006**

Yamanouchi, Tadahira

POLLUTION RESEARCH AND ZOOTRON. *(Kogai kenkyu to zutoron). Text in Japanese. Seikatsu to Kankyo (Life Environ.), 18(4):17-21, April 1973. 7 refs.*

The zootron is a building provided for the study of environmental factors using animals; various artificial factors provided for animal experiments and the facilities are discussed. Artificially adjustable factors include: the meteorological elements such as temperature, humidity, air pressure, and wind; the physio chemical elements such as noise, vibration, light, odor, gases, and dusts; the habitat factors such as the building, cages, and the floor conditions; the nutritional factors such as water and feed; and the biological factors such as hemogeneity and heterogeneity of environmental cohabitants. The air supplied into the animal experimental labs is filtered through to eliminate dusts and bacteria. The odor in a zootron is caused by the animals themselves and the feed material. The odor is controlled based on the ammonia gas emitted from animal excretions and is usually kept under 20 ppm. The exhausts from the animal chamber can be a source for air pollution, and it should be deodorized before emission. Toxic gases, bacteria, and radioactive material waste from experiments must be treated before emission.

**28978** **APTIC NO. 50554**

Yasuoka, Takashi and Shummei Mitsuzawa

OXIDATION OF NITRIC OXIDE AT HIGH TEMPERATURE. *(Koon ni okeru issanka chisso no sanka). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 682, 1973. (Presented at the Japan Chemical Society, Spring Meeting, 28th, Tokyo, Japan, April 1-5, 1973, Paper 2D40.)*

Oxidation of nitric oxide was studied using porcelain, alumina, quartz (Bernoulli method), and quartz (vacuum fusion) tubes. One to three ppm of NO was passed through the tube at 50-500 ml/min; relative humidity was below 90%. The tube was heated to 200-700 C. The highest oxidation efficiency (with reference to potassium permanganate-sulfuric acid oxidizing solution) was about 100% with the Bernoulli method. Lowest efficiency (below 50%) was with the porcelain or alumina tubes. Efficiency above 600 C decreased, since nitrogen dioxide decomposes to nitric oxide and oxygen. Quartz tube efficiency decreased after long exposure to high temperature.

**28979** **APTIC NO. 50993**

Yoshikawa, Akira, Katsuhito Yamaguchi, and Yoshio Inoue

HEAVIER GAS FLOW IN OPEN CHANNEL (PART 2). *(Kaiko-nai no omoi gasu no ryudo (2)). Text in Japanese. Kuki Chowa Eisei Kogaku (J. Japan Soc. Heating, Air-Conditioning Sanitary Engrs.), 47(3):33-39, March 1973. 3 refs.*

Heavier gas flow releasing in a steady state from the end exhaust slit open channel was analyzed by a method analogus to that of water flow in open channel. A one dimensional equation for flow direction was derived from a basic equation by averaging the necessary variables at any section of channel and was solved on reasonable boundary conditions. The results obtained for up-stream region were in agreement with experiments for the stable stratified flow region of downstream.

### 1972

**28980** **APTIC NO. 50815**

Ali, Joseph S.

A MICROWAVE POWER CONTROLLER FOR A RADIATION BIO-EFFECTS EXPOSURE FACILITY. *Environmental Protection Agency, Rockville, Md., Twinbrook Research Lab., Office of Research and Monitoring EPA-R4-73-018, 46p., June 1972.*

NTIS: PB 220305

A device was designed to control and monitor the environmental parameters of an animal exposure chamber. The system includes a double-walled lucite sphere that serves as the exposure chamber which is located within an anechoic chamber; an atmospheric conditioning unit that supplies a predetermined mixture of atmospheric gas to the exposure chamber under specified conditions of humidity, temperature, and velocity; a 2450 MHz microwave exposure source; a laboratory built microwave power controller; and a laboratory computer with auxiliary equipment that controls the system automatically and records the subject s physiological responses for subsequent analysis. A complete documentation of the microwave power controller for use with a Varian Associates Model PPS-2.5 AS high power industrial generator developed to improve the operating characteristics of the exposure chamber irradiation facility is presented. Theory of operation, photographs, circuit schematic drawings, wiring diagrams, and a parts list of the controller are given. The controller makes the power output insensitive to low frequency line voltage fluctuations and also permits the power output to be programmed automatically. (Author abstract modified)

**28981** **APTIC NO. 50801**

Andersson, Gun, Cyrill Brosset, and Peringe Grennfelt

THE STABILITY OF EMITTED ODOROUS COMPOUNDS IN THE ATMOSPHERE. *Preprint, Swedish Water and Air Pollution Research Lab., Gothenburg, 12p., Nov. 1972. 29 refs.*

Reactions involved with the air chemistry of odorous compounds and affecting their stability in the atmosphere are reviewed. The reactions of hydrogen sulfide, methyl mercaptan, ethyl mercaptan, dimethyl sulfide, and dimethyl disulfide with ozone, atomic oxygen, and sulfur dioxide were examined. The mechanisms of oxidation, photolysis, thermal decomposition, and the removal of the organic sulfur compounds from the gas phase by adsorption were also studied.

**28982** **APTIC NO. 50814**

Chan, Daniel Tzeng-Long

TURBULENT NONBUOYANT OR BUOYANT JETS DISCHARGED INTO FLOWING OR QUIESCENT FLUIDS. *Iowa Univ., Iowa City, Dept. of Mechanics and Hydraulics, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1972, 162p. 36 refs.*

The causes and effects of the deflection of round turbulent jets in crossflows were evaluated by analytical and experimental methods, and inclined turbulent buoyant jets discharged into quiescent homogeneous receiving fluids were analyzed. A general description of the flow pattern is given; a mathematical model, employing a linear superposition of two different entrainment modes, is described. Experimental apparatus, instrumentation, and procedures used to determine entrainment velocity are presented. Experiments with the round turbulent jet in a cross stream revealed that there is a positive pressure region in front of the jet and a negative pressure region in its wake, and that the total centerline velocity of jet decays more rapidly along the trajectory of a jet in a cross-flow than along a free jet. Inclined turbulent buoyant jets discharged into quiescent homogeneous fluids were studied. Their behaviors were controlled by the jet outlet densimetric Froude number and the initial angle of discharge. The turbulent entrainment between the jet and the ambient fluids was the main mechanism which diffused the original jet momentum and diluted the initial jet concentration along the trajectory. Values of the entrainment coefficients, drag coefficients, and the turbulent Schmidt number used in the mathematical analyses are given.

**28983** **APTIC NO. 50823**

Clark, William Edgar

MEASUREMENTS OF AEROSOLS PRODUCED BY THE PHOTOCHEMICAL OXIDATION OF $SO_2$ IN AIR. *Minnesota Univ., Minnesota, Dept. of Environmental Sciences, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1972, 153p. 41 refs.*

The formation and growth of aerosols produced by the photooxidation of sulfur dioxide in air was measured and characterized over the size range from 0.004 to 0.4 millimicron using a Whitby Aerosol Analyzer and a Condensation Nuclei Counter. Seven experiments were performed over extended periods of time for a range of sulfur dioxide concentrations from 0.049 to 2.88 ppm. The volume concentration increased linearly with time indicating a steady condensation of material from the vapor to the condensed phase. Volumetric conversion rates ranged from 0.389 to 22.9 cu millimicron/cu cm/hr. After an initial rapid increase, the aerosol surface area concentration approached an equilibrium value which was an increasing function of the volumetric conversion rate. The volume mean diameter for each experiment increased linearly with time at a rate which correlated strongly with the volumetric conversion rate. Interrupting the aerosol development by turning off the ultraviolet lights resulted in an abrupt termination of the condensation of new material indicating the discontinuation of the photooxidation process. The size distributions of the aerosol continued to shift to larger sizes and spread in width by coagulation. The overall photooxidation rate was calculated. Values adjusted to noon-day sunlight intensity ranged from 0.379 to 0.992 %/hr. An estimate was also made of the partial pressure of sulfuric acid present in the vapor phase at the onset of the homogeneous nucleation process. (Author abstract modified)

**28984** **APTIC NO. 50602**

Fukuyama, Yuzo

PROTEINURIA IN ITAI-ITAI DISEASES AND CADMIUM POISONING. *(Itai-itai byo oyobi kadomiumu osen ni tomonau tampakunyo). Igaku to Seibutsugaku, 84(1):41-46, Jan. 10, 1972. 8 refs. Translated from Japanese, 10p.*

The differences between different types of urinary protein caused by cadmium poisoning and other types of kidney diseases were studied. The urinary proteins associated with itai-itai diseases and cadmium pollution consisted of five sections, three of which were low molecular proteins. Only a small portion of these precipitated by treatment with sulfosalicylic acid. The urinary proteins of ordinary kidney diseases consisted of two protein sections, both high molecular proteins, and most of these precipitated by the sulfosalicylic acid treatment.

**28985** **APTIC NO. 50603**

Fukuyama, Yuzo and Kentaro Kubota

EPIDEMIOLOGICAL SURVEY OF URINARY PROTEIN FROM INHABITANTS IN THE ITAI-ITAI DISEASE DISTRICT. *(Itai-itai byo hassei chiiki jumin no nyo tampaku no eikigakuteki kosatsu). Igaku to Seibutsugaku, 84(4):249-253, April 19, 1972. 8 refs. Translated from Japanese, 8p.*

Urinary protein from the inhabitants of itai-itai disease districts was examined by four different methods. The discharge rate of urinary protein in these areas increased approximately in proportion to the number of years of residence in the area. The urinary protein showed the same type of pattern as that associated with itai-itai disease and contained proteins of low molecular weight. The discharge rate was also correlated with geographical location relative to the cadmium-contaminated waters.

**28986** **APTIC NO. 50604**

Fukuyama, Yuzo and Kentaro Kubota

GEOGRAPHIC AND HISTORICAL SURVEY OF URINARY PROTEINS IN THE INHABITANTS OF THE ITAI-ITAI DISEASE DISTRICT. *(Itai-itai byo hassei chiiki jumin no nyotanpaku no chiriteki rekishiteki haikei). Igaku to Seibutsugaku, 84(5):305-310, May 10, 1972. 10 refs. Translated from Japanese, 9p.*

The urinary proteins of inhabitants of 12 districts located near water systems where the itai-itai disease has occurred were studied. The G25 protein ratio began to increase after 20 years of residence in the area and increased in proportion with the number of years of residence after the length of residence time reached 40 years. The slope of the asymptote was negatively correlated with the distance from the point of water intake. Patterns characteristic of the itai-itai disease were primarily seen among the inhabitants residing in the area for over 30 years. The occurrence ratio increased with the number of years in residence.

**28987** **APTIC NO. 50605**

Fukuyama, Yuzo and Kentaro Kubato

RELATIONSHIP BETWEEN PROTEINURIA AND HEAVY METAL POLLUTION IN THE ITAI-ITAI DISEASE DISTRICT. *(Itai-itai byo hassei chiiki jumin no nyotanpaku to dojo cho no jukinzoku nodo tono kankei). Igaku to Seibutsugaku, 85(3):103-106, Sept. 10, 1972. 3 refs. Translated from Japanese, 6p.*

The correlation between the urinary protein discharge rate of the inhabitants of an itai-itai disease district and the heavy metal (cadmium, lead, and zinc) concentrations in the soil of the rice paddies in the area was investigated. Both the asymptotic slope of the G25 protein ratio distribution curves and the positive ratios increased in proportion with the metal concentrations in the soil. The most probable cause of heavy metal in the soil and the itai-itai disease is metal pollution of the Jinzu river.

**28988** **APTIC NO. 50433**

Ito, Masatoshi and Yoshihiro Takei

MEASUREMENT OF SULFUR CONTENT IN HEAVY OIL BY A SULFUR METER. *(Sarufa meta ni yoru juyu-chu iobun no sokutei ni tsuite). Text in Japanese. Yamaguchi-ken Eisei Kenkyusho Nenpo (Ann. Rept. Yamaguchi Prefect. Res. Inst. Health), no. 14:80-82, Aug. 1972.*

A sulfurmeter using x-rays was used to measure the amount of sulfur in heavy oil used in Yamaguchi Prefecture. The average sulfur content was 1.85-2.27 wt%. The maximum content was 2.65 wt% and the average of low sulfur heavy oil was 0.813 wt% (ranging from 0.17-1.46 wt%). The results obtained by the sulfurmeter agreed well with those obtained by the Japanese Industrial Standard method.

**28989** **APTIC NO. 50596**

Iznatev, A. D. and V. Ya. Shabliy

BETTER COOPERATION BETWEEN SANITARY AND VETERINARY SERVICES IN CONTROLLING THE USE OF PESTICIDES. *(Bolshe vzaimodeystviya mezhdu sanitarnoy i veterinarnoy sluzhoby v dele kontrolya za pravilnym primeneniem pestitsidov). Gigiena i Sanit., 7(8):110- 111, Aug 1972. Translated from Russian, 3p.*

Some of the subjects discussed at a conference of specialists in hygiene and veterinary sanitation are reviewed. The reports included topics directly concerning nutritional hygiene, specifically the retention of pesticides by various plants and food products and their potential effects on human health.

**28990** **APTIC NO. 50970**

Jones, J. M. and J. L. J. Rosenfeld

A MODEL FOR SOOTING IN DIFFUSION FLAMES. *Combustion Flame, 19(3):427-434, Dec. 1972. 4 refs.*

The onset of sooting is predicted for laminar diffusion flames by an extension of the Burke-Schumann theory of such flames. Deviations from these predictions are caused by effectively finite soot-oxidation rates and by enhanced mixing due to turbulence. Both effects are discussed. The fraction of carbon in the fuel liberated as soot is determined largely by the physical characteristics of the flame rather thay by the detailed chemical nature of the fuel. The effect on soot production of the addition of oxygen to the fuel was studied under conditions for which the physical parameters were carefully controlled.

**28991** **APTIC NO. 50593**

Kagan, Yu. S., L. M. Sasinovich, and G. L. Ovseyenko

TENTATIVE ESTIMATION OF HYGIENIC STANDARDS OF PESTICIDES IN FOOD PRODUCTS USING CORRELATION ANALYSIS OF TOXICITY AND CUMULATION INDICES. *(Sposob orientirovochnovo rescheta gigienicheskikh normativov pestitsidov v produktakh pitaniya s pomoshchye korrelyatsionnovo analiza pokazateley toksichnosti i kumulyatsii). Gigiena i Sanit., 7(7):44-46, July 1972. 6 refs. Translated from Russian, 5p.*

Correlation analysis was used to determine the presence, type, and strength of relations between the indices of toxicity and cumulation of pesticides and their permissible residual content (PRC) in food products. A series of equations of linear and polynomial regression were obtained for a tentative estimation of PRC and indicated adequate correspondence between estimated and experimental standards.

**28992** **APTIC NO. 50621**

Korniyenko, T. G. and A. I. Samchuk

DETERMINATION OF BERYLLIUM IN NATURAL WATERS. *(Opredeleniye berillya v prirodnykh vodakh). Ukr. Khim. Zh., 38(9):917-919, Sept. 1972. 7 refs. Translated from Russian, 5p.*

A method for the determination of beryllium in water samples was reviewed. Acetylacetone was used to bind the beryllium in a metalloorganic compound for subsequent extraction by carbon tetrachloride in the presence of complexon III. The determination was by photometric methods with respect to the reaction with beryllon II. A method for colorimetric determination was also examined. The sensitivity of the method was 0.04 micrograms/ml of beryllium, with a relative error in the visual determination of 10%.

**28993** **APTIC NO. 50595**

Korolev, A. A., S. A. Skigan, B. R. Vitsitskaya, and I. M. Sechenov

THE EFFECT OF OZONATION ON THE ANTICHOLINESTERASE ACTIVITY OF SEVERAL PHOSPHORORGANIC PESTICIDES. *(Vliyanie ozonirovaniya na antikholinesteraznuyu aktivnost nekotorykh fosfororganicheskikh pestitsidov). Gigiena i Sanit., 7(8):99-101, Aug. 1972. 3 refs. Translated from Russian, 6p.*

The effect of ozonation on several phosphororganic pesticides used to treat water supplies and sewage was investigated. Solutions of methylnitrophosphorus (MNP), acetophosphorus (AP), and coral were administered to animals once, intraperitoneally, before and after ozone treatment, and the activity of cholineasterase in whole blood was determined after 3, 24, and 48 hours. Ozone treatment increased the anticholineasterase effect of MNP and coral and decreased that of AP.

**28994** **APTIC NO. 50620**

Nassi, L., G. Poggini, C. Vecchi, and P. Galvan

THE APPLICATION OF ATOMIC ABSORPTION SPECTROSCOPY TO THE DETERMINATION OF THE TOTAL ZINC (FREE AND BOUND) IN COLOSTRUM AND IN HUMAN MILK. *(La spettrofotometria ad assorbimento atomico applicata al dosaggio dello zinco totale, libero e legato, nel colostro e nel latte umano). Boll. Soc. Ital. Biol. Sper. (Naples), vol. 48:86-89, 1972. 7 refs. Translated from Italian, 6p.*

The total zinc content, as free and bound fractions, in colostrum and human milk was studied using atomic absorption spectroscopy. The experimental procedure, instrumentation, analytical technique, and results are reviewed. The average zinc values and standard deviations were calculated.

**28995** **APTIC NO. 50760**

Nicholson, R. A. and J. D. Smith

SOURCE UNIT FOR THE FLAMELESS ATOMIC ABSORPTION DETERMINATION OF MERCURY. *Lab. Pract. (London), 21(9):638, Sept. 1972. 1 ref.*

Flameless atomic absorption spectroscopy provides a satisfactory and economical method for detecting as little as 0.1 ng of mercury in environmental materials and foodstuffs. The method uses chemical preconcentration of mercury from an acid solution onto a silver wire coil. The apparatus is described which is used for determining the mercury amalgamated with the silver. The auxiliary apparatus is permanently mounted on a trolley, and the conversion from normal to flameless operation takes less than two minutes. The system is used mainly with a Perkin Elmer 403, but is also used in conjunction with a Varian Techtron AA5 and a Pye Unicam SP90. Operation and construction of the apparatus are described.

**28996** **APTIC NO. 50670**

Okuno, Toshihide and Masahiko Tsuji

STUDIES ON THE CONTROL OF ODOR SUBSTANCES. II. ON THE REACTIVITY OF CARBON DISULFIDE WITH OZONE. *(Shuki seibun no jokyo ni kansuru kenkyu (dai2ho). Niryuka tanso to ozon no hannosei). Text in Japanese. Hyogo-ken Kogai Kenkyusho Kenkyu Hokoku (Rept. Public Nuisance Res. Inst., Hyogo Prefect.), no. 4:1-6, Dec. 1972. 10 refs.*

The reactivity of the carbon disulfide-ozone system was examined quantitatively under dynamic reaction conditions at 40 C and reaction times of 5, 9, and 23 sec. The products of the reaction were sulfur dioxide, carbonyl sulfide, and carbon dioxide, and their concentrations increased in proportion to the 03 concentration. The SO2 was further oxidized to form sulfur trioxide and sulfuric acid. The unreacted CS2 was also estimated.

**28997** **APTIC NO. 50969**

Pompei, Francesco and John B. Heywood

THE ROLE OF MIXING IN BURNER-GENERATED CARBON MONOXIDE AND NITRIC OXIDE. *Combustion Flame, 19(3):407-418, Dec. 1972. 15 refs.*

Nonuniformities and rates of mixing play an important role in determining emissions of carbon monoxide and nitric oxide from a kerosene-fueled atmospheric-pressure burner. Nonuniformities are allowed for by assuming that burned gas eddies have a normal distribution of equivalence ratios about the mean value. Mixedness is characterized by the ratio of the standard deviation of this distribution to the mean value and is related to combustor operating variables. A simple one-dimensional flow model is coupled with the mixing model to predict the variation of CO and NO concentrations with atomizing pressure and distance along the burner. The data obtained agree with the predictions and show clear mixing effects on both CO and NO concentration levels. A gas temperature model is also included. Diagrams are presented of mean burned temperature versus distance for three equivalence ratios, calculated from total heat loss, energy balance estimates, and analysis of combustion gas heat transfer rates to the inside wall of the burner. (Author abstract modified)

**28998** **APTIC NO. 50779**

Wadden, Richard Albert

A MODEL OF A GROWING COAGULATING AEROSOL. *Northwestern Univ., Evanston, Ill., Dept. of Chemical and Environmental Engineering, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1972, 155p. 81 refs.*

A continuously reinforced aerosol, undergoing change by particle growth and coagulation, and particle removal at some largest size, was described by a number balance equation. For the steady state condition, the number balance equation was solved numerically for the distribution of particle concentrations as a continuous function of particle volume. The particle growth rate was based on rate data describing the manganese ion, iron ion, and non-catalyzed aqueous phase conversion of sulfur dioxide to sulfuric acid. The catalyst and the $H_2SO_4$ were assumed to be contained in drops, which grew with acid production, due to the accretion of water vapor. The number balance equation without growth was also solved. The calculated particle distributions were classified into three general categories: coagulation alone, growth and coagulation, and non-growth systems. The coagulation alone system did not include a growth term, and the resulting distribution showed a mild dependence on the shape of the feed distribution at small values of volume, and a power law dependence at large values of volume. Of the catalysts studied, only calculations on manganese ion catalyzed systems resulted in distributions which reflected detectable effects of both growth and coagulation. The non-growth cases were those with iron ion catalyzed and non-catalyzed $SO_2$ conversions. At large values of volume, all three categories displayed a log-log, straight-line relationship between particle concentration and volume with a slope of negative 1.3 to negative 1.5. (Author abstract modified)

## 1971

**28999** **APTIC NO. 50784**

Brakhnova, I. T. and L. N. Bazhenova

CRYSTAL LATTICE STRUCTURE OF ELEMENTS AND COMPOUNDS AS AN INDEX OF THEIR TOXIC PROPERTIES. *(Stroenie kristallicheskoi reshetki prostykh veshchestv i soedinenii kak pokazatel ikh toksicheskogo deistviya). Hyg. Sanit. (English translation from Russian of: Gigiena i Sanit.), 36(10):121-129, 1971. 30 refs.*

The toxicity and crystal structure of metals and nonmetals are discussed in relation to Samsonov s model of the configurational localization of electrons. The toxic properties of chemical substances are stronger when there is a lower degree of symmetry of the crystal lattice. Substances with a body-centered cubic lattice (BCC) are mostly characterized by mild pneumoconiotic properties. Substances with a face-centered cubic lattice (FCC) structure have a chronic general toxic effect with damage to the parenchymatous organs. Substances with a hexagonal close packing lattice (HCP) or other less symmetric structures (orthorhombric, rhombohedral, tetragonal) possess marked toxic properties and are liable to cause both acute and chronic poisoning. The crystal lattice characteristics of inorganic substances may be utilized as a criterion in the tentative evaluation of the toxic properties of new chemicals. The recommended tentative maximum permissible concentrations are 6-10 mg/cu m for substances with a BCC structure, 3-5 mg/cu m for substances with an FCC lattice, and 1-2 mg/cu m for substances with an HCP lattice. The maximum permissible concentrations of other substances with less symmetric crystal lattices should not exceed 0.5 mg/cu m.

**29000** **APTIC NO. 50600**

Fukuyama, Yuzo, Kazuko Shiroishi, and Kentaro Kubota

EVALUATION OF SCREENING TESTS FOR PROTEINURIA IN ITAI-ITAI DISEASE. *(Itai-itai byo kenshin ni okeru nyo tampaku no sukurininguho no kento). Igaku to Seibutsugaku, 83(3):85-90, Sept. 10, 1971. 10 refs. Translated from Japanese, 11p.*

The discharge rate of urinary protein among the inhabitants of itai-itai disease districts and comparison districts was investigated by the sulfosalicylic method, the TCA method, the gel filtration method, and the electric disc method. The detection rate was less than 4% among the inhabitants of the comparison districts but was clearly higher among those in the itai-itai disease districts. Detection rates also varied greatly according to the method of detection used. Urinary protein observable among the inhabitants of the itai-itai disease area appeared first in the electric disc pattern, followed by the gel filtration method, the sulfosalicylic method, and the TCA method.

**29001** **APTIC NO. 50601**

Fukuyama, Yuzo

AN ATTEMPT AT DIFFERENTIATION OF URINARY PROTEINS BETWEEN CADMIUM-POISONED AND OTHER KIDNEY DISEASE PATIENTS. *(Kadomiumu osen ni tomonau nyo tampaku to kakushu jinshikkan no nyo tampaku no kambetsu no kokoromi). Igaku to Seibutsugaku, 83(4):139-143, Oct. 10, 1971. 4 refs. Translated from Japanese, 8p.*

The characteristic differences between urinary proteins caused by cadmium poisoning such as the itai-itai disease and those caused by other types of kidney diseases were studied. In cases of itai-itai disease and other cases of cadmium poisoning, the P-quotient was 40-60%. In the urine of patients with chronic nephritis and other kidney diseases, most of the urinary protein precipitated when treated with sulfosalicylic acid, and the P-quotient was as low as 10-25%.

**29002** **APTIC NO. 50611**

Golebiowski, Stanislaw

DISTRIBUTION OF VANADIUM, NICKEL AND PORPHYRINS IN CRUDE OIL DISTILLATES. *(Rozmieszczenie wanadu, niklu i porfiryn w destylatach ropy naftowej). Nafta (Katawice), 27(11):378-380, Nov. 1971. 11 refs. Translated from Polish, 8p.*

The distribution of various metals, including vanadium, nickel, silicon, iron, calcium, magnesium, aluminum, manganese, copper titanium, lead, sodium, zinc, barium, strontium, chromium, cobalt, tin, silver, molybdenum, arsenic, and mercury, and porphyrins in fractions obtained during the crude oil distillation process was studied. The elements Si, Fe, Ca, Mg, Mn, Cu, and Cr appeared in all distillates, and their content increased with an increase in fraction boiling temperature. The content of Al, Zn, Sn, Pb, and Na changed non-homogenously in distillations, while Ti, Ba, Sr, Co, Ag, Mo, As, and Hg accumulated mainly in distillation P-4 and the remainder. Vanadium and nickel appeared in vacuum distillations and the remainder. Porphyrins behaved similarly.

**29003** **APTIC NO. 50613**

Nordmann, R. and J. Nordmann

STUDIES OF THE REGULATION OF CARBOHYDRATE METABOLISM IN VIVO. III. INFLUENCE OF THE INHIBITION OF FATTY ACID OXIDATION. *(Recherches sur la regulation du metabolisme glucidique in vivo. III. Influence de l inhibition de l oxydation des acides gras). Biochimie, vol. 53:705-708, 1971. 18 refs. Translated from French, 8p.*

The effect of beta-mercaptoethanol on the concentrations of the principal metabolic intermediates of carbohydrate metabolism was studied to determine the relation between these concentrations and fatty acid catabolism. Administration of beta-mercaptoethanol to rats decreased the concentrations of glycogen, the initial metabolic intermediates of glycolysis, and alpha-glycerophosphate in the liver. The concentration of the end-products of glycolysis, i.e., phosphoenol pyruvate, pyruvate, and lactate, substantially increased. Liver malate, aspartate, and glutamate decreased; the concentration of alpha-ketoglutarate slightly increased; and the concentration of citrate was unchanged. The beta-hydroxybutyrate/acetacetate and lactate/pyruvate ratios substantially decreased, reflecting an increase in the free NAD-positive/free NADH ratio in the liver mitochondria and the extramitochondrial space. The correlation between these changes and the inhibition of liver fatty acid oxidation was also examined.

**29004** **APTIC NO. 50612**

Suchkov, B. P.

SELENIUM CONTENT IN THE BASIC FOOD PRODUCTS OF THE POPULATION OF THE UKRAINIAN SSR. *(Soderzhaniye selena v osnovnykh produktakh pitaniya naseleniya Ukrainskoy SSR). Vopr. Pitaniya, vol. 30: 75-77, 1971. 14 refs. Translated from Russian, 7p.*

The basic food products from various zones of the Ukrainian SSR were tested photometrically for their selenium content. Of the food samples, 57.66% of the grain, 61.28% of the vegetable and fruits, 5/6 of the meat, and 2/3 of the milk and milk products contained prophylactic concentrations of selenium, i.e., 0.1-1 mg/kg. The maximum concentration of selenium was 1.33 mg/kg; therefore, no chronic selenium intoxication linked with the use of local food products is predicted for the population.

## 1970

**29005** **APTIC NO. 50599**

Fukuyama, Yuzo and Kentaro Kubota

OSTEOPATHY AND NEPHROPATHY IN THE INHABITANTS OF A CADMIUM- POLLUTED DISTRICT. *(Kadomiumu osen chiku jumin no kotsubyohen to jinshogai). Igaku to Seibutsugaku, 81(1):37-42, July 10, 1970. 7 refs. Translated from Japanese, 9p.*

The bone membrane ratio and the G25 protein ratio were used as indicators of itai-itai disease in epidemiological investigations correlating the effects of cadmium poisoning with geographical locations and water pollution. The extent of osteopathy and nephropathy among the residents of the polluted areas was measured, and data were tabulated according to age categories. The degrees of osteopathy and nephropathy were extremely low among inhabitants who were 50 years old or less and increased among inhabitants over 50 years old. Nephropathy advanced before osteopathy.

**29006** **APTIC NO. 50606**

Fukuyama, Yuzo and Kentaro Kubota

GEL FILTRATION PATTERN OF THE URINE OF ITAI-ITAI DISEASE PATIENTS. *(Itai-itai byo kanja nyo no geru roka patan). Igaku to Seibutsugaku, 80(1):31-36, Jan. 10, 1970. 10 refs. Translated from Japanese, 9p.*

The gel filtration pattern of the urine of itai-itai disease patients was studied. The patterns of these patients differed significantly from those of healthy patients or patients with other kidney diseases. The ratio between the first peak (P) and the total value of Folin reaction (P + Q + R) was 25-40% for itai-itai disease, 15-40% for suspected itai-itai disease, 15-40% for acute nephritis and nephrose, 25-80% for chronic nephritis, and less than 10% for healthy subjects.

**29007** **APTIC NO. 50597**

Kobota, Kentaro, Ryoji Matsue, Yuzo Fukuyama, Mihoko Ishimoto, and Nobutatsu Takayanagi

RENAL DAMAGE IN EXPERIMENTAL CADMIUM POISONING IN THE MOUSE. *(Jikkenteki kadomiumu chudokusho no jinshogai). Igaku to Seibutsugaku, 80(6):315-320, June 10, 1970. 6 refs. Translated from Japanese, 11p.*

The effect of cadmium poisoning on kidney metabolism was studied in a series of experiments with mice. Cadmium was administered orally, and the gel filtration pattern of the urine was examined. Pathological and histopathological changes in the kidneys were also studied. The physiological protein of normal mice began to decrease and disappeared as cadmium was administered. After about 40 days, urinary proteins characteristic of the Fanconi symptom group appeared, and approximately from the 54th day, the urinary gel filtration pattern became similar to that of a patient with itai-itai disease.

**29008** **APTIC NO. 50598**

Matsue, Ryoji, Yuzo Fukuyama, Mihoko Ishimoto, Kentaro Kubota, and Nobutatsu Takayanagi

BONE DAMAGE IN EXPERIMENTAL CADMIUM POISONING BY ORAL ADMINISTRATION IN THE MOUSE. *(Jikkenteki kadomiumu chudoku ni okeru kotsuhenka). Igaku to Seibutsugaku, 81(1):33-36, July 1970. 9 refs. Translated from Japanese, 6p.*

The effect of cadmium administered orally on the development of characteristic bone damage in mice was investigated. The bone membrane ratio, histological patterns, and x-ray photographs of the femurs were studied. As soon as the cadmium administration was started, the bones began to thin, reducing the bone membrane ratio to 20-25% in 10-35 days. Osteopathy started prior to the appearance of abnormal urinary protein. Slow absorption of body fluid-like bone material was also observed.

## 1968

**29009** **APTIC NO. 50608**

Druckrey, H.

CHLORINATED DRINKING WATER, TOXICITY TESTS, INVOLVING SEVEN GENERATIONS OF RATS. *(Chloriertes Trinkwasser, Toxizitaets- Pruefungen, an Ratten ueber sieben Generationen). Food Cosmet. Toxicol., vol. 6:147-154, 1968. 8 refs. Translated from German, 18p.*

The effects of chlorinated water on seven generations of rats were investigated. Highly chlorinated water, containing 100 mg/l, was well tolerated when given on a daily basis. There were no toxic effects on propagation, growth, blood, and histology of liver, spleen, kidneys, or other organs. The incidence of malignant tumors was identical in test animals and the control group.

**29010** **APTIC NO. 50623**

Scuka, M.

EFFECTS OF ZINC SULFATE ON CHICKEN EMBRYO. *(Effetti del solfato di zinco nellembrione del pollo). Boll. Soc. Ital. Biol. Sper. (Naples), vol. 44:1590-1592, 1968. 3 refs. Translated from Italian, 5p.*

The effects of zinc sulfate on the development of the body and the intestines and on the activity of the endocrine glands of chicken embryos were examined. The treatment had no effect on body growth or the development of the liver and the heart. The activity of the thyroid glands, as measured by histological tests, was affected significantly. On removal, the gland was more voluminous and more filled with blood than that of the control group. The average follicular diameter also increased considerably, and follicles of larger diameter were present in higher numbers.

## 1967

**29011** **APTIC NO. 50592**

Balin P. N.

SOME DATA ON THE TOXICITY OF MANEB. *(Nekotorye dannye k voprosy o toksichnosti maneba). Gig. Toksokol., 1967:93-97, 1967. Translated from Russian, 5p.*

The toxic effect of maneb, a fungicide which disintegrates into carbon bisulfide, carbon thiooxide, hydrogen sulfide, and ethylene diamine, on rats was studied. After a single administration of commercial and purified maneb containing 85.5 and 87%, respectively, of the basic substance to the stomach, the lethal dose (LD50) was 4575 mg/kg of commercial maneb and 5270 mg/kg of purified maneb. The preliminary symptoms included excitation followed by depression, listlessness, inactivity, increased frequency of respiration, paresis of the lower extremities, blindness, and ultimate death. Based on autopsy results, changes in the gastrointestinal tract were noted. Maneb was also applied to skins of rats and eyes of rabbits.

**29012** **APTIC NO. 50617**

Petrovich, Yu. A.

PENETRATION OF CHLORINE INTO THE TISSUE AND HUMOR OF AN INTACT AND A DENERVATED EYE (EXPERIMENTS WITH A RADIOACTIVE CHLORINE ISOTOPE). *(Proniknoveniye khlora v tkani i zhidkosti intaknogo a denervirovannogo glaza). Oftalmol. Zh., 22(5):354-357, 1967. 7 refs. Translated from Russian, 9p.*

The permeability of eye tissue to the radioactive chlorine isotope Cl-36 was studied in rabbits injected with sodium chloride containing Cl-36 to determine the mechanism of renovation of this halogen in the tissues and humors of the intact and denervated eye. The activity of the Cl-36 in the blood gradually diminished, but then increased sharply between 15-180 min in the aqueous humor. The activity of the aqueous humor slowly decayed after 12 hours; the same was true for the cornea, except for a lower level of inclusion. Activity in the iris was lower than in the cornea during the first 3 hours, increased until it reached the 12-hour point, then decreased slowly. The lowest activity within the first 3 hours was in the vitreous body, but this increased and, upon reaching the 12-hour point, differed from the aqueous humor only in the content of the isotope.

**29013** **APTIC NO. 50618**

Vorobyeva, A. I.

COPPER AND ZINC BALANCES IN HEALTHY CHILDREN AGED 2, 6 AND 8-10 YEARS. *(Balanc medi i tsinka v organizme zdorovykh detey v vozraste 2, 6, i ot do 10 let). Vopr. Pitaniya, 26(4):28-30, July/Aug. 1967. 6 refs. Translated from Russian, 6p.*

The copper and zinc balances in children 2, 6, and 8-10 years old were investigated. In 2-year old children, the balance of the trace elements was much higher than in the children of the older age groups. When given food containing 0.974 mg Cu and 4.34 mg Zn, the organisms of the 2-year-olds retained 70.2 and 53% of the elements, respectively. The trace element balances for the children of the 8-10 year old group, given food containing 1.86 mg Cu and 10.9 mg Zn, were 18.4 and 3.8% of the elements, respectively.

**29014** **APTIC NO. 50591**

Zelman, I. B., H. Wisniewski, W. Graban, and M. Januszewska

CHANGES IN THE BRAIN AFTER INJECTION OF BERYLLIUM (7 BE). *(Zmiany w mozgu po podaniu berylu (7 Be)). Neuropatol. Pol., 5(3):351-364, 1967. Translated from Polish, 18p.*

The effect of beryllium on the central nervous system, exclusive of the blood-brain barrier, was studied using rabbits as the experimental animal. Both nonradioactive and radioactive beryllium (Be 7) were administered by injection into the brain. The beryllium caused damage to the nerve cells and granulomatic changes with respect to the connecting tissue. The neuron changes had a focal character, limited to the area of highest Be concentration. The reaction of the membranes, vessels, and microglia exceeded the symptomatic inflammatory changes and was disproportionate to the nerve tissue damage, suggesting a special type of reaction of the connecting tissue to Be toxicity.

## 1966

**29015** **APTIC NO. 50589**

Pham-Huu-Chanh and M. Maciotta-Lapoujade

IMMEDIATE TOXICITY OF BERYLLIUM SULFATE FOR THE PIGEON AND THE CHICKEN. *(Toxicite immediate du sulfate de beryllium a l egard du pigeon et du poulet). Agressologie, 7(6):597-601, Nov./Dec. 1966. 18 refs. Translated from French, 8p.*

The immediate toxic effect of beryllium sulfate on pigeons and chickens was studied in a series of continuous intravenous perfusion experiments. The perfusion rate was chosen so that the birds died within about 60 min (+ or 10 min). The lethal dose was 1.49 + or 0.16 g/kg for the pigeon and 0.56 + or - 0.15 g/kg for the chicken. Beryllium sulfate, therefore, was three times as aggressive toward the chicken as toward the pigeon. Of all animals used in similar experiments, the chicken was the most sensitive and the rat was the most resistant, with pigeons in the second position after the rat. The average lethal dose of beryllium sulfate at the threshold of probability (p equals 0.05) was also determined for rats, rabbits, cats, and dogs.

## 1940

**29016** **APTIC NO. 50622**

Romcke, Olaf and O. K. Evensen

THE CHLORINE POISONING IN MJONDALEN. *(Klorgassforgiftningen i Mjondalen). Nord. Med., vol. 7:1224-1226, 1940. Translated from Norwegian, 10p.*

The clinical history of an incident of chlorine poisoning in Mjondalen and the subsequent examinations, symptoms, and treatments are reviewed. In most of the 85 patients admitted for treatment, the symptoms of intoxication were characterized by a slight irritation of the eyes and respiratory tract, nausea, vomiting, drowsiness, apathy, and further development to coughing and dyspnea. The more severe cases manifested pulmonary edema. The treatment included rest and oxygen treatment. There were three deaths: two shortly after the incident and the third, of bronchopneumonia, five days later.

# EFFECTS-HUMAN HEALTH

## 1973

**29017** **APTIC NO. 50425**

Adachi, T., K. Hasegawa, T. Miyamoto, Y. Inoue, H. Kamitsuji, K. Kawa, K. Murata, and M. Hayashida

CLINICAL FINDINGS ON PHOTOCHEMICAL SMOG IN OSAKA. *(Osaka ni okeru kokagaku sumogu no rinsho). Text in Japanese. Shonika Shinryo (J. Pediat. Pract.), 36(3):307-312, March 1973. 4 refs.*

Airway irritation, eye irritation, hypernea, and circulation reduction were symptoms of children hospitalized Aug. 27, 1971 during a photochemical smog episode. The symptoms disappeared from between 1 and 12 days of hospitalization. Two patients had headache, numbness of extremities, nausea and other nervous system symptoms. Mental instability prior to the episode led to increased symptoms during the episode. The lung and liver were also slightly affected. Animal experiments have revealed that resistance to influenza virus and pneumonia decreased after exposure to nitrogen dioxide. Thus, photochemical smog occurrences are likely to cause chronic disturbances.

**29018** **APTIC NO. 50737**

Araki, Shunichi, K. Ushio, and H. Katsunuma

ACTIVE LEAD ACCUMULATION (TEISINGER ET AL.) BY THE JAPANESE. *(Honpo ippanjin ni okeru kasseien chikuseki (Teisinger ra) no taido ni tsuite). Text in Japanese. Preprint, Japan Society of Industrial Hygiene, p. 306-307, 1973. (Presented at the Japan Society of Industrial Hygiene, Annual Meeting, 46th, April 1973, Paper 417.)*

The amounts of lead in the blood and urine, delta-aminolevulinic acid in erythrocytes, delta-aminolevulinic acid in the urine, and coproporphyrin in urine were related. Age and the amount of excreted lead by calcium EDTA were significantly correlated. Body height and naturally excreted lead in urine were also correlated. The accumulation of active lead in humans is discussed.

**29019** **APTIC NO. 50898**

Arner, Elizabeth C. and Rodney A Rhoades

LONG-TERM NITROGEN DIOXIDE EXPOSURE. *Arch. Environ. Health, 26(3):156-160, March 1973. 30 refs.*

Male Long Evans hooded rats were chronically exposed to an average 2.9 ppm of nitrogen dioxide 24 hr/day, 5 days/wk for 9 mo. The major effects of NO2 were a significant 12.7% increase in lung weight, a 13.0% decrease in lung compliance, and a significant reduction in surface-active properties of the lung wash. The NO2-exposed lungs also revealed a significant 8.7% decrease in lung lipid content and a marked decrease in percentage of total saturated phospholipid fatty acids. This reduction in saturation was due almost entirely to a decrease in the percentage of palmitic acid. Alterations in lung lipid metabolism was the underlying mechanism which leads to some of the pulmonary effects following long-term exposure to subacute levels of nitrogen dioxide. (Author abstract modified)

**29020** **APTIC NO. 50724**

Bell, Karl A. and S. K. Friedlander

AEROSOL DEPOSITION IN MODELS OF A HUMAN LUNG BIFURCATION. *Staub, Reinhaltung Luft, 33(4):178-182, April 1973. 18 refs.*

Particle deposition was measured in idealized two and three dimensional models of the first bifurcation of the human lung. Curves of local transfer rates in the two dimensional model for particles of unit density in the size range 0.365 to 7.6 micron were similar in form to those for the collection efficiency of fibrous filters, with diffusion and impaction the controlling mechanisms of deposition. Particle transfer rates within 275 micron of the two dimensional model carina were at least an order of magnitude higher than those 2.5 cm downstream. Deposition patterns were measured for 2.02-, 1.1- and 0.79-micron particles in the three dimensional model. A contour diagram of constant transfer coefficient for the 0.79-micron particles was prepared showing the possible effects of secondary flows and of sedimentation. A peak hot spot on the diagram had a transfer coefficient more than 4.6 times larger than the average value.

**29021** **APTIC NO. 50856**

Camner, Per, Klas Philipson, and Ture Arvidsson

WITHDRAWAL OF CIGARETTE SMOKING. A STUDY OF TRACHEOBRONCHIAL CLEARANCE. *Arch. Environ. Health, 26(2):90-92, Feb. 1973. 9 refs.*

Tracheobronchial clearance was studied with a test aerosol of 6 micron monodisperse particles of fluorinated ethylene propylene (Teflon 120), tagged with 99mTc, produced by a spinning disc technique. External measurements of the radioactivity in the lungs determined the rate of clearance. Seventeen smokers were studied while they were smokers, one week after they had stopped smoking, and three months after cessation. Their clearance on the average was faster 3 mo after they had stopped smoking, but nearly unchanged 1 wk after they had stopped.

**29022** **APTIC NO. 50892**

Chigusa, Midori

THE EFFECTS OF OZONE ON HEREDITARY CHARACTERISTICS OF FLIES. *(Ozon ni yoru shojobae no identeki eikyo ni tsuite). Text in Japanese. In: A Progress Report on Public Nuisance Researches, No. 2: Basic Medical Experiments concerning Photochemical Smogs. (Kogai kenkyu chukan hokoku, No. 2: Kokagaku sumoggu ni kansuru kiso igakuteki jikkenteki kenkyu). Tokyo Metropolitan Government (Japan), Inst. of Hygiene, p. 34-40, March 1973.*

The effects of ozone on the hatchability, oviposition rate, emergence rate, and life cycle of flies were investigated. Two or three-day-old flies were separately put in exposure jars, and were exposed to 10 ppm (group I) and 27 ppm (group II) of ozone 1-3 hr daily for 4 days. IMmediately after the period of exposure, two or three each of the males and females were separately put in cultivation jars and kept at 25 C, longevity was studied. With the offsprings of group I, the life cycle almost remained the same. The life of group II was especially shortened among male flies. The effect of exposed chromosomes was analyzed in various ways.

**29023** **APTIC NO. 51014**

Doi, Mutsuo

ENVIRONMENTAL POLLUTION OF CITIES BY MERCURY AND ITS EFFECTS. *(Toshi ni okeru suigin ni yoru kankyo osen to sono eikyo). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), no. 4:257-261, March 1973. 15 refs.*

Using the human hair and tuna fish, the mercury residue in fish was examined. The residues vary greatly by location, the type of tunas, and the time of fishing. The difference between the minimum (0.04 ppm) and the maximum (1.15 ppm) is approximately 30 times. The fluctuation is not clear, but the difference in the pollution of the water, or the difference in the age of fish may be considered. At the present time, a popular theory for the cause of tuna fish pollution is by natural causes such as a volcanic eruption or a mercury mine floor. But considering that 50-70% of mercury residue in tuna is methyl mercury, it is difficult to believe that none of it comes from human or industrial involvement in creating pollution. The maximum accumulation found in the human hair to date is 69 ppm among the sailors, 52 ppm among the restaurant chefs, and 25.6 ppm among the fish market workers; but the effects on the human body are not clear. Light cases of lowered Achiles tendon reflex, Adiadocochinase, have been recognized.

**29024** **APTIC NO. 50952**

Endo, Tatsuichi, Shigeru Nagaoka, and Masaki Umeda

THE EFFECTS OF AIR POLLUTION ON THE RESPIRATORY SYSTEM OF BIRDS, NO. 1: CARBON POWDER EXPOSURE EXPERIMENTS ON CHICKENS. *(Taiki osen no chokokyuki ni oyobosu eikyo (daiippo). Niwatori no tanpun bakuro jikken) Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), no. 4:256, March 1973.*

One-week old chickens and rats were placed in 100-liter plastic exposure chambers and exposed to 0.05 micron carbon particles 5 million/cu ml (45 mg/cu m), 2 hr/day for 2 days. Another group was forced to inhale orally 5 mg carbon particles dissolved in 0.2 cc biological saline water. The animals were killed immediately after the inhalation, and 1, 3, 7, and 14 days later for studies. The lung carbons among the dust exposure groups were in the areas of the first to the third bronchi, in greater quantity in the third bronchus. The peripheral areas of lung had small amount of dust, and in deeper areas, almost no particles were found. In the group forced to inhale particles containing water, the animals slaughtered on the 3rd and 7th days had particles around the third bronchus and in the lymphatic cells of the first and second bronchi. Thus, dusts in the lungs are taken into the third bronchi area rather quickly and move to the second and the first bronchi areas quickly.

**29025** **APTIC NO. 50419**

Fukabori, Sumie, Osamu Tada, and Kenji Nakaaki

THE NORMAL URINE EXCRETION OF LEAD, CADMIUM, MERCURY, AND FLUORIDE. *(Ippan kenkojin no nyochu-en, kadominmu, suigin, fusso no haisetsu ni tsuite). Text in Japanese. Japan Society of Industrial Hygiene, p. 188-189, 1973. (Presented at the Japan Society of Industrial Hygiene, Annual Meeting, 46th, April 1973, Paper 305.)*

Urine from 400 healthy residents in the metropolitan Tokyo area was analyzed for content of lead, cadmium, mercury, and fluorine. The Pb content was compared to that in urine from occupational workers exposed to an atmosphere containing different concentrations of Pb. The urine of healthy persons contained 6.94 + or 4.18 micrograms Pb/l, 0.82 + or - 0.62 micrograms/Cd/l, 10.37 + or 8.21 micrograms Hg/l and 0.50 + or - 0.29 micrograms F/l. The Pb content in urine from workers exposed to 0.01-0.03 mg/Pb/cu m was 14-17 micrograms/l, from those exposed to 0.05-0.10 mg Pb/cu m was 30-60 micrograms/cu m, and from those exposed to 0.17-1.67 mg/cu m of lead was 75-95 micrograms/cu m.

**29026** **APTIC NO. 50927**

Hackl, H.

OBSERVATIONS ON A SHIFT TO DIFFERENT TYPES OF LUNG CANCER WITHIN THE PAST DECADE. *(Beobachtungen ueber eine Typenverschiebung des Lungenkrebses im letzten Jahrzehnt). Text in German. Med. Welt (Stuttgart), 24(15):568-572, 1973. 41 refs.*

Comparative studies of lung cancer over the past two decades revealed a shift of the various histological types towards alveolar cell carcinoma. Contrary to all other forms of lung cancer, this one was found as frequent among men as women. Consequently cigarette smoking cannot be the primary cause for this type of cancer. It is very likely that the increasing environmental pollution of water and air has some relationship to this. Any direct connection with inhaled pollutants must be ruled out for the following reason. An intense literature study turned out only cases of alveolar cell carcinoma in man caused by years of exposures to finely atomized oil. However, there is strong indication for an indirect connection between alveolar cell carcinoma and the inhalation of air pollutants.

**29027** **APTIC NO. 50897**

Hamilton, John D., Gerald M. Halprin, Kaye H. Kilburn, James A. Merchant, and John R. Ujda

DIFFERENTIAL AEROSOL CHALLENGE STUDIES IN BYSSINOSIS. *Arch. Environ. Health, 26(3):120-124, March 1973. 16 refs.*

Cotton textile mill workers with conditions diagnosed as byssinosis or not byssinosis by a modified Medical Research Council (MRC) questionnaire were challenged with extracts of cotton dust fractionated by filter membrane dialysis, and volatilization. Byssinotic subjects responded with a significant decrease in forced expiratory volume 1.0 and with clinical symptoms to the inhalation of whole raw cotton extract and nonvolatile, nondialyzable cotton extract compared to saline, volatile extract, and dialyzable extract. Subjects without byssinosis responded the same to saline as to all other extracts. Comparison of response of byssinotic and nonbyssinotic subjects showed no statistically significant differences with any extract. The active agent in cotton dust is water soluble, filterable at 0.22 micron, nonvolatile at 40 C, and nondialyzable, but may not be active only in that group of patients identified as byssinotic by questionnaire.

**29028** **APTIC NO. 51009**

Horiguchi, Shunichi, Kozo Shinagawa, Tadao Utsunomiya, Hiroo Nakano, and Keiko Teramoto

A TRIAL TO ASSUME ABSORPTION AND EXCRETION OF LEAD IN THE HEALTHY JAPANESE POPULATION (REPORT 3) FROM THE STANDPOINT OF THE FIRST ORDER REACTION THEORY. *(Ippan kenko nihonjin no enshushi suitei no kokoromi (sono 3). Ichiji hanno sokudoron no tachiba kara). Text in Japanese. Sangyo Igaku (Jap. J. Ind. Health), 15(1): 78-79, Jan. 1973. 5 refs.*

Using mathematical equations for the speed of excretion and the amount of the residue in the body, the lead intake into the body through the esophagus and trachea, the absorption rate, the absorption amount, the lead content in the air, the inhalation amount, the absorption rate, and the amount through the respiratory system were calculated. Estimating the biological half life of lead for the bones as 10 years and for soft systems to be 0.5 years, and estimating the limit for lead accumulation for a healthy normal Japanese to be 80 ng, the time required for reaching that amount was calculated. The daily absorption of lead contributing to the accumulation of lead in the bones and soft systems are approximately 14 micrograms and 30 micrograms, respectively, and the time to reach the maximum would be 43.2-66.5 years. When the daily lead absorption is estimated to be 22.5-60 micrograms, the time required for reaching 80 mg is 13.8-45.4 years, and the biological half life for lead is 3.1-7.1 years.

**29029** **APTIC NO. 50891**

Kano, Fumio

THE REACTION OF MUCOUS GERMS (PHYSARUM POLYCEPHALUM) TO OZONE. *(Nenkin no ozon hanno). Text in Japanese. In: A Progress Report on Public Nuisance Researches, No. 2. Basic Medical Experiments Concerning Photochemical Smogs. (Kogai kenkyu chukan hokoku, No. 2: Kokagaku sumoggu ni kansuru kiso igakuteki jikkenteki kenkyu). Tokyo Metropolitan Government (Japan), Inst. of Hygiene, p. 31-34, March 1973.*

The transformation mechanism of cells in the presence of ozone was studied using physarum polycephalum (mucous bacteria). The protoplasmic streaming is often used as a test material for the study of ecological life cycles. The plasmodium of physarum polycephalum is made of gels and sols. Plasmodia moves by the streaming of internal sols and gels, the immobile cells are constantly changing into sols, and sols are transforming into gels which form the external shape. Exposure of the plasmodia causes a clear transformation of this phenomenon. First, the cycle of streaming reverses itself, and the foremost portion of sols changes into gels drastically and retreats; the mesh of sols disappears, and the streaming movement stops. In other words, ozone affects the gel-forming system. The streaming movement of plasmodia is a passive flow caused by the change of internal pressure. Therefore, if the threads (the ends) of plasmodia are kept under enough pressure to keep it at a standstill while observing through a microscope, the amount of pressure required to create such a state can be measured. Using this method, plasmodia of physarum polycephalum were exposed to 0.3-0.5 ppm ozone. A slight decrease of streaming was caused. This meant that the sols in the exposed part changed into gels and the generative power was reduced considerably; but at the same time, streaming occurred in order to supplement the shortage of sols.

**29030** **APTIC NO. 50400**

Kitamura, Masaji

STUDIES ON THE INTESTINAL ABSORPTION OF PCB, BIOLOGICAL HALF LIFE, AND RESIDUE IN THE LIVING BODY. *(PCB no chokan kyushuritsu, seibutsugakuteki hangenki, narabini seitainai chikuseki ni kansuru kenkyu). Text in Japanese. Kankyo Hoken Reporto (Environ. Health Rept.), no. 18:42-8, March 1973.*

Commercial polychlorinated biphenyls (PCB) were orally administered to female mice and the toxicity was observed. The lethal dose 50 ranged from 3 to 11 g/kg and there was no difference between dichlorinated, trichlorinated, and tetrachlorinated biphenyls. Administration of 500 micrograms of PCB and measurement of the PCB in intestinal tubes after 1, 3, 6, 24, and 48 hours revealed that the absorption of PCB in intestines was about 30-40%. Intraperitoneum injection of PCB showed that the half-life of 2,4-dichlorinated biphenyl was about 12 hours, while that of tri-, tetra-, and pentachlorinated biphenyls were about 3-4, 6, and 20-25 days, respectively.

**29031** **APTIC NO. 50416**

Kyono, Yoko, Katsunori Honma, and Kiyoyuki Kawai

THE BEHAVIOR OF SUBMICRON LEAD PARTICLES IN THE BODY. REPORT NO. 2: INHALATION EXPERIMENTS. *(Submicron enryushi no seitainai kyodo, dainiko: kyunyu jikken). Text in Japanese. Japan Society of Industrial Hygiene, p. 312-313, 1973. (Presented at the Japan Society of Industrial Hygiene, Annual Meeting, 46th, April 1973, Paper 420.)*

Two groups of 9-week-old mice (body weight 260-340 g) were exposed respectively to: lead fume, concentration 120 mg/cu m, particle size 0.3 micron, bulk density 1.30, exposure time, 1.5 hr, 3 hr, and 24 hr; and lead fume, concentration 10 mg/cu m, particle size 0.04 micron bulk density 1.40, exposure time 1.5 hr, 3 hr, and 5.5 hr. The mice were sacrificed and the lungs were fixed with 5% glutaraldehyde and 1% osmic acid. The sample was studied by a electron microscope, and the Pb particles in the sample were detected by a non-dispersive micro-x-ray analyzer. There was no substantial difference between the two cases; Pb particles were localized in alveolar phagocytes and in lysosomes generally 1-2 particles in the former and several particles in the latter; the longer the time of exposure was, the more particles were found in lysosomes.

**29032** **APTIC NO. 50889**

Makino, Kuniyoshi

PHOTOCHEMICAL SMOG. *(Kokagaku sumoggu). Text in Japanese. In: A Progress Report on Public Nuisance Researches, No. 2: Basic Medical Experiments Concerning Photochemical Smogs. (Kogai kenkyu chukan hokoku, No. 2: Kokagaku sumoggu ni kansuru kiso igakuteki jikkenteki kenkyu). Tokyo Metropolitan Government (Japan), Inst. of Hygiene, p. 26-27, March 1973.*

Samplings of automobile exhaust gases at the time of idling and normal driving were taken and the relationships between the components and eye irritation were examined. Idling gas had a low rate of eye irritation, and had no relationship with the concentration of various eye irritating pollutants such as acrolein, peroxyacetyl nitrate, and formaldehydes. The normal speed exhaust gas caused a little more eye irritation, but no clear relationship was discovered with pollutant concentration. A smog chamber with ultraviolet ray lamps and an exposure window was used for an experiment for examining the rate of eye irritation and the components in artificial photochemical smog. The rate of eye irritation was measured by the time it took between the exposure and eye irritation. The measurements of oxidant, hydrocarbons, nitrogen oxides, carbon monoxide, temperature and humidity were taken. Exhaust gas from normal speed driving was used. Eye irritation occurred even without pollutants but with a certain amount of ultraviolet ray in the chamber. The rate of eye irritation was zero when UV ray was zero; 5.9% when UV was 100 microwatt, 11.1% with 300 microwatt; and 13% with 500 microwatt, which is half the amount of UV in the midsummer sunlight. A complex relationship between eye irritation and the amount of oxidant, HC, PAN, and temperature was suspected. The NOx seemed not to cause eye irritation.

**29033** **APTIC NO. 50962**

Martin, H. and O. Berger

THE OCCUPATIONAL LEAD INTOXICATION AND ITS INTERNAL SYMPTOMS. *(Die gewerbliche Bleiintoxikation als internistisches Krankheitsbild). Text in German. Med. Welt (Stuttgart), 24(15):589-592, 1973.*

The symptoms of lead intoxication and biochemical changes through the use of automobile gasolines which contain lead additives in the form of tetraethyl or tetramethyl lead, a wide sector of the population is exposed to lead. The lead quantities emitted by automobile exhausts are estimated to amount to 20 tons/yr for Zurich. For Philadelphia a lead emission of 0.5 tons/day has been calculated. In 16% of the employees of the city cleaning department of Frankfurt/Main, an intolerable lead level was found. Through the high affinity of the heavy metal to the erythrocyte membranes, circulating erythrocytes are influenced. At reduced activity of the ATPase in the erythrocyte membrane, a higher discharge of potassium ions and water into the plasma was observed as one of the early symptoms of lead exposure. The transport of labeled phosphorus through the erythrocyte membrane is disturbed. The life time of erythrocytes is shortened through the effect of lead. Lead disturbs the hemoglobin synthesis and obstructs the delta-aminolevulinic acid dehydrase. Parallel to an increase of the lead level in the serum, the delta-aminolevulinic acid concentration in the serum increases. The method for diagnosing lead intoxication in one special case is discussed. Therapeutic measures are described.

**29034** **APTIC NO. 50896**

McLaughlin, Martha and Gordon J. Stopps

SMOKING AND LEAD. *Arch. Environ. Health, 26(3):131-136, March 1973, 15 refs. (Presented at the American Academy of Occupational Medicine, Annual Meeting, 24th, Pittsburgh, Pa., Feb. 11, 1972.)*

The smoking habits of over 4000 Du Pont employees were compared with their urine and blood lead levels. The mean urine lead levels were 27.1 micrograms/l for nonsmokers, 28.6 micrograms/l for cigarette smokers, and 29.0 micrograms/l for pipe and/or cigar smokers. Mean blood lead values were 19.1 micrograms/100 ml, 19.9 micrograms/100 ml, and 17.3 micrograms/100 ml, respectively, for the three groups. The data were submitted to a multiple regression analysis to determine if the differences in groups were associated with smoking habits or a reflection of other variables. No evidence was found to indicate significant effect of smoking on blood levels. The influence of smoking on urine lead levels, while statistically significant, was very small compared with the total variability of the data and probably of no biological significance. The study of absorption of lead from cigarette smoke may give some insight into the contribution or urban lead aerosols to human lead levels, since the particulates in cigarette smoke have diameters similar to the mass median equivalent diameters of urban lead particulates. (Author abstract modified)

**29035 APTIC NO. 50861**

Moorman, William J., Joseph J. Chmiel, Jerry F. Stara, and Trent R. Lewis

COMPARATIVE DECOMPOSITION OF OZONE IN THE NASOPHARYNX OF BEAGLES. ACUTE VS CHRONIC EXPOSURE. *Arch. Environ. Health, 26(3):153-155, March 1973. 5 refs.*

The mean tracheal concentration of ozone was measured in two groups of physiologically unaltered beagles. One group was exposed to O3 for 18 mo and consisted of four subgroups exposed to the following daily concentrations/time regimens: 1 ppm/8 hr, 2 ppm/8 hr, 3 ppm/8 hr, and 1 ppm/24 hr. The control group consisted of previously unexposed beagles sampled similarly at either 1 ppm O3 or 3 ppm O3 following 1 hr of acclimatization. For groups receiving equal O3 concentrations, the chronically exposed subjects had statistically higher mean tracheal concentrations of O3. All dogs inspiring higher concentrations of O3 demonstrated significantly higher mean tracheal concentrations. The subgroup chronically exposed to 1 ppm/24 hr had statistically higher mean tracheal concentrations than the chronically exposed subgroup receiving 1 ppm/8 hr. (Author abstract modified)

**29036 APTIC NO. 50994**

Nagayama, Yuzuru

FINE MORPHOLOGIC STUDY ON THE EFFECT OF SOME AIR POLLUTANTS ON THE CLINIATED CELLS OF THE TRACHEA OF THE GUINEA PIG. SCANNING AND TRANSMISSION ELECTRON MICROSCOPIC OBSERVATIONS. *(Aryusan gasu oyobi jidosha haiki gasu no kikanjohi ni oyobosu eikyo ni tsuite. Toku ni senmo no keitaigakuteki henka ni kansuru sosagata narabi ni takagata denken shoken). Text in Japanese. Nichidai Igaku Zasshi (Nippon Univ. Med. J.), 32(1):69-106, Jan. 1973. 15 refs.*

An experimental study was conducted to observe the pathological effect of sulfur dioxide and exhaust gas from a gasoline engine on the ciliated cells of the trachea using both scanning and transmission electron microscopes. Guinea pigs were exposed to 120 ppm of a sulfur dioxide-air mixture for 3 to 9 hours. Another group of animals were placed in a chamber containing exhaust gas which had been previously diluted with air to avoid the death of animals due to carbon monoxide intoxication. There was a marked disorder of the ciliary arrangement throughout the trachea. In each cilium, numerous tiny cyst-like bulgings were found, mainly near the tip of the cilium. In some animals, there were many peculiar protrusions or crater-like processes on the surface of the trachea exposed to sulfur dioxide for long periods (6 to 9 hr); they completely lost their proper morphologic features and formed uneven and irregular network patterns. The effects of the exhaust gas-air mixture on the tracheal cilia were much more intense than cases of the sulfur dioxide inhalation group.

**29037 APTIC NO. 50923**

Nelson, C. J., C. M. Shy, T. English, C. R. Sharp, R. Andleman, L. Truppi, and W. VanBruggen

FAMILY SURVEYS OF IRRITATION SYMPTOMS DURING ACUTE AIR POLLUTION EXPOSURES: 1970 SUMMER AND 1971 SPRING STUDIES. *J. Air Pollution Control Assoc., 23(2):81-90, Feb. 1973. 11 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 65th, Miami Beach, Fla., June 1972.)*

Studies of acute irritation symptoms during high pollution exposures in the summer of 1970 and in April 1971 in New York and Birmingham are reported. Total suspended particulate concentrations in high exposure neighborhoods during episodes ranged from 172 to 192 micrograms/cu m in New York and from 179 to 269 micrograms/cu m in Birmingham. Sulfur dioxide levels were 340 micrograms/cu m in New York and less than 16 micrograms/cu m in Birmingham. Cough, chest discomfort, and restricted activity were most consistently affected during episodes. Excess symptom rates occurred during air pollution exposures below the 24-hour national primary standards for total suspended particulates and sulfur dioxide. Analysis of these effects provides intelligence for revising existing national standards of air quality. Symptom patterns are characterized during relatively low level of air pollution episodes, to provide information on acute effects produced by exposure to sulfur dioxide and suspended particulate matter. Smoking, sex, and socio-economic factors were related to the effects.

**29038 APTIC NO. 50411**

Ogata, Masana and Takao Saeki

THE QUANTITATION METHOD FOR THE TOLUENE CONTENT IN THE BLOOD USING GAS CHROMATOGRAPHY WITH A CARBURETOR. *(Shiryo kikasochi o tsukatta gasu kuromatografu ni yoru ketsuekichu no toruen nado no teiryoho ni tsuite). Text in Japanese. Preprint, Japan Society of Industrial Hygiene, p. 386-387, 1973. (Presented at the Japan Society of Industrial Hygiene Annual Meeting, 46th, April 1973.)*

Hydrocarbons (toluene, xylene, and hexane) in blood were analyzed by carbon sulfide extraction gas/liquid chromatography, and direct injection gas/liquid chromatography methods. Micro amounts of toluene, xylene, or hexane in blood were extracted with CS2 (or chloroform) and the extract was analyzed by a TCEP column with nitrogen as a carrier gas. Blood containing 80-1600 micrograms of toluene or xylene was injected into a sample vaporizing apparatus, and the hydrocarbon was analyzed by molecular sieve 5A column with N2 as the carrier gas. Relatively good results were obtained. Intramuscular injection of toluene in a mouse confirmed the transmittal of the compound into brain and placenta.

**29039 APTIC NO. 50890**

Osawa, Nobuyoshi

HEMOLYSIS OF OZONE. *(Ozon no yoketsu sayo ni tsuite). Text in Japanese. In: A Progress Report on Public Nuisance Researches. No. 2: Basic Medical Experiments Concerning Photochemical Smogs. (Kogai kenkyu chukan hokoku, No. 2: Kokagaku sumoggu ni kansuru kiso igakuteki jikkenteki kenkyu). Tokyo Metropolitan Government, Inst. of Hygiene, p. 26-27, March 1973.*

Some cases in the photochemical smog incident of a Tokyo junior high school caused a suspicion of bilirubin hemolysis. Experiments were conducted to see the extent of the hemolysis reaction of ozone, acrolein, toluene, and xylene to erythrocytes. Blood of healthy persons each, was sampled, washed in biological saline water three times, and 5 cu cm of erythrocyte solution was prepared. In a 2.66 cu m chamber, 0.5 ppm concentrations of ozone, acrolein, toluene, and xylene were prepared separately, and erythrocyte solutions were exposed to these gases. The absorption rate was measured near 575 millimicron, and the rate was compared with that of the control erythrocyte liquid. The test material was also exposed to the mixtures of ozone and toluene, and ozone and acrolein. Some degree of fluctuation occurred. But in general, the hemoglobin amount in each exposure group was higher than that of the control group. This seemed to show a tendency of hemolysis. The rate was lower for the material exposed to the mixture of ozone and toluene than for other groups. The highest contrasting hemolysis rate was noted in the group exposed to the mixture of ozone and acrolein. The control group hemolysis rate was noted in the group exposed to the mixture of ozone and acrolein. The control group hemolysis rate was 0.52%, and the exposure group rate was 2.1%. Further experiments are required.

**29040** **APTIC NO. 50929**

Schlipkoeter, Hans-Werner

SICK FROM URBAN AIR. AIR POLLUTION AND ITS EFFECT ON HUMANS. *(Krank von der Stadtluft. Luftverschmutzung und ihre Einwirkung auf den Menschen). Text in German. Tech. Umweltmag., (2):20-23, April 1973.*

The effect of air pollutants can be studied on man, animals, and plants. Since experiments with humans can be carried out on a limited scale only, animal experiments and in-vitro studies on isolated organs are most frequently employed. Epidemiological studies are of value too. The effects of carbon monoxide, sulfur dioxide, the oxides of nitrogen, and polycyclic hydrocarbons on man are reviewed. At present it is thought that an increase of the carboxyhemoglobin value to 2% is harmless. This value is exceeded if the atmospheric CO concentrations exceed 8 to 10 mg/cu m over long-term periods and 30 to 40 mg/cu m over a short-term period (1 hr). A rise of the SO2 level to above 1 mg/cu m, as is frequently the case at inversions, increases the mortality rate. Chronic inhalation of low concentrations (90 to 200 micrograms/cu m) increases the number of respiratory diseases. In the year 1969/70 a total of 2 million tons of hydrocarbons were emitted in the Federal Republic of Germany. It is expected that this amount will rise by 75% until 1980. The measured hydrocarbon concentrations in West Germany fluctuate between 1 and 10 ppm in industrial centers; sometimes as much as 30 ppm have been measured.

**29041** **APTIC NO. 50679**

Schmidt, F.

ON THE HEALTH DANGERS AND IMPAIRMENT OF EFFICIENCY CAUSED BY PASSIVE SMOKING. *(Ueber die Gesundheitsschaeden und die Beeintraechtigung der geistigen Leistungsfaehigkeit durch Passivrauchen). Text in German. Oeffentl. Gesundheitswesen (Stuttgart), 35(4):150-156, 1973. 29 refs.*

Nonsmokers are subject to the same health dangers as smokers due to passive smoking. Their mental efficiency can be impaired in closed rooms contaminated with tobacco smoke. The high carbon monoxide content of cigarette smoke is primarily responsible for the mental impairment. Tobacco smoke also consists of several hundred chemical substances whose effects on humans are not adequately known.

**29042** **APTIC NO. 50448**

Schmidt, P.

THE SIMULTANEOUS EFFECT OF SEVERAL ENVIRONMENTAL FACTORS OF MAN - LITERATURE SURVEY CONCERNING THE SITUATION IN THE PLASTICS INDUSTRY. *(Zur simultanen Einwirkung mehrerer Umweltfaktoren auf den Menschen - Literaturbericht ueber die Situation in der Kunststoffindustrie). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 19(1):9-17, Jan. 1973. 92 refs.*

A literature survey of articles on industrial toxicity and occupational medicine concerning the plastics industry revealed that scientific proof of the simultaneous effect of several environmental factors (combined pollutants) is scarcely available. Certain scientifically verified conceptions exist concerning the evaluation of the effect of pollutant mixtures (mostly simple summations). All other combinations (chemical substances, climatic factors, and noise) and their effect on man, although widespread, are hardly known. Experiments on the combined effect of alcohol and carbon monoxide on man and rats are described in the literature. They showed that the COHb level of the blood was lower under the influence of alcohol. No significant summation effect of alcohol and carbon monoxide was observed in dogs. An alphabetic list of the pollutants emitted by the plastics industry is given.

**29043** **APTIC NO. 51007**

Sekizawa, Yoshiko and Shigeru Nagaoka

RESULTS OF A QUESTIONNAIRE OF THE EFFECTS OF PHOTOCHEMICAL SMOG ON THE HUMAN BODY. *(Kokagaku sumoggu no jintai cikyo ni kansuru anketo chosa kekka). Text in Japanese. Tokyo-to Kogai Kenkyusho- ho (Ann. Rept. Tokyo Metropol. Res. Inst. Environ. Protection), no. 4:264-271, March 1973.*

The students of 12 Tokyo high schools situated close to air pollution monitoring stations were given questionnaires on their health, and the relationship between conscious symptoms and oxidant concentration was examined. The period covered 12 days in Sept. 1971. Photochemical smog warnings were issued four times in September, one of which was during the investigation period. The rate of symptom occurrences ranged from 18.8 to 50.6%, the lowest in the western suburb of Tokyo and the highest in an industrial area of Tokyo. However, the consciousness indexes were not necessarily in agreement with the degree of pollution for other high schools. Six schools showed no clear tendency, though one of them is in the center of heavy traffic and business section. In two schools, high rates of throat and eye irritation were noted on the day of high oxidant concentration, but at one location, the local oxidant concentration was low. The irritation seemed to have come from a high sulfur dioxide concentration. On the other hand, some schools showed low percentages of conscious symptoms on the day of high oxidant concentration. In the area where the days oxident concentration was highest (24 pphm), coughing, throat pain, and eye irritation increased. There was no clear difference by sex. Investigation of this type should take human and social factors into consideration as well as school events, special physical conditions, individual physiological characteristics, and epidemics. Indexes for other pollutants, especially those of sulfuric acid mist and formaldehydes should be examined.

**29044** **APTIC NO. 50667**

Shy, Carl M. and John F. Finklea

AIR POLLUTION AFFECTS COMMUNITY HEALTH. *Environ. Sci. Technol., 7(3):204-208, March 1973. 5 refs.*

The Community Health and Environmental Surveillance System, a national program which relates community health to changing environmental quality is described. The system consists of a series of standardized epidemiologic studies designed to measure simultaneously environmental quality and sensitive health indicators in sets of communities representing exposure gradients to common air pollutants. The purpose of the system is to evaluate existing environmental standards, to obtain health intelligence for new standards, and to document health benefits to air pollution control. The program includes 33 neighborhoods in six areas of the United States: New York-New Jersey, Chattanooga, Tenn., Birmingham-Charlotte, St. Louis, Mo., Utah, and the Los Angeles Basin. The seven health indicators under surveillance include: chronic respiratory disease in adults, acute lower respiratory disease in children, acute upper respiratory disease in families, daily asthma frequency, acute irritation symptoms during air pollution episodes, pulmonary function of schoolchildren, and tissue residues of cumulative pollutants in humans. In addition, daily aggravation of symptoms in subjects with preexisting heart and lung disease is being followed in the New York and Utah areas. The health indicators are contrasted over time and space within the framework of high, intermediate, and low-exposure communities with a daily variation in air quality. Replication of pollutant exposures in several areas permits development of exposure-effects models in one area and confirmation of models in another area. Areas are selected with particular emphasis on highly prevalent ubiquitous pollutants including particulate matter, sulfur oxides, and nitrogen oxides. The possibility of detecting pollutant interactions is enhanced by selecting areas with principle exposure to SO2 alone, to particulate matter alone, and to combinations of the two pollutants.

**29045** **APTIC NO. 50452**

Suzuki, Akio, Mir[illegible]o Yamada, and Sumiko Ishizu

THE CADMIUM CONTENT IN THE ORGANS OF ANIMALS EXPOSED TO CADMIUM CHLORIDE MIST. *(Enka kadomiumu misuto kyunyu dobutsu no zokinai kadomiumuryo ni tsuite). Text in Japanese. Preprint, Japan Society of Industrial Hygiene, p. 274-275, 1973. (Presented at the Japan Society of Industrial Hygiene, Annual Meeting, 46th, April 1973, Paper 401.)*

Groups of 19 to 32 male mice were exposed to air containing 5% and 10% cadmium chloride mist for 8 hr. The mice were sacrificed 22 hr after the exposure was stopped, and the cadmium contents in the spermaries, livers, and kidneys were compared to that of mice subjected to Cd injection. The Cd contents were detected by atomic absorption method. Almost 9.4% and 27.7% of the 5% CdCl2 and 10% CdCl2 exposure group died 22 hr after the exposure, whereas all mice injected with 1 mg and 2 mg of Cd per Kg body weight survived. All the injection groups showed hemorrhage in the spermary, while only slightly over half of the exposure group showed the same symptom. The Cd contents in the organs of exposure groups were slightly higher than those of the injection groups.

**29046** **APTIC NO. 51005**

Suzuki, Takato and Shigeru Nagaoka

THE SUSCEPTIBILITY TO SEROTONIN AND THE EXPOSURE TO OZONE. *(Ozone bakuro to serotonin kanjusei). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), no. 4:262-263, March 1973.*

As part of a study on air pollutants and allergy, the body susceptibility to serotonin was examined after an exposure to ozone. Six to seven week old rats were placed in an exposure chamber and were exposed to various concentrations of ozone at the velocity of two ventilations/min. The concentration was continuously measured by the ethylene chemiluminescence method. Serotonin was diluted to 0.9% sodium chloride solution, and less than 1 ml was injected into the abdomen at a time. When the rats were exposed to 5 ppm ozone for 3 hr and various amounts of serotonin were injected into the abdomen 15-20 min later, reactions took place in 2-3 min. Excessive breathing, difficult breathing, tears, and cyanosis occurred, but only the group exposed to ozone had convulsions followed by death, 2 hr after the injection. The animals that did not die recovered to a normal state in 1-3 hr. Those exposed to the clean air only prior to the serotonin injection did not die even with 50 mg/kg serotonin, but the exposed group reacted to a 10 mg/kg administration with a 19% mortality. Mortality was higher in proportion to the concentration of ozone: 17% for 3 ppm; 25% for 4 ppm; 67% for 5 ppm; and 75% for 6 ppm. Death among the 3 ppm group took place slowly, in 2-5 days instead of 2 hr as in the case of other groups. For less than 3 ppm ozone, mortality was less, and the group exposed to 1 ppm had no deaths. Mortality reduced reversely in proportion to the time between exposure and injection. The body susceptibility to serotonin is enhanced because of the multiplication effect of the serotonin freed from the fat cells of rat by ozone and the externally injected serotonin. The susceptibility is enhanced up to 12.5 hr after the exposure.

**29047** **APTIC NO. 50901**

Thomson, Maurice L. and Demetri Pavia

LONG-TERM TOBACCO SMOKING AND MUCOCILIARY CLEARANCE. *Arch. Environ. Health, 26(2):86-89, Feb. 1973. 15 refs.*

The rate of mucociliary clearance was estimated from the removal of inhaled radioactive particles in 79 elderly subjects, 50 of whom had healthy lungs and 29 of whom had respiratory impairment (obstructive in 13 and restrictive in 16). The 29 impaired subjects had on the average a faster clearance than the normal group, a difference that almost approached significance (5% level) at 6 hr after the inhalation of the aerosol. The obstructed subjects showed the fastest clearance with the restricted group intermediate between these and the normal group. No significant difference was found between the rates of clearance of smokers, nonsmokers, and exsmokers in either healthy or diseased groups. Forced expiratory volume and forced vital capacity was measured in all subjects. (Author abstract modified)

**29048** **APTIC NO. 50414**

Tsuji, Yoshito

STUDIES ON THE TOXICITY OF FLUORIDE UNDER SOME ENVIRONMENTAL POLLUTIONS. *(Fukkabutsu ni yoru chiiki osen to seitai). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 9(4):324-330, April 1973. 62 refs.*

The relationship between fluoride and teeth, such as cases of mottled teeth, prevention of decay, and bone formation are discussed. Normally, mottled teeth are formed as a result of consumption of water containing 0.3-0.8 ppm F. However, air pollution containing F has produced some mottled teeth cases in the Kita area of Fukushima prefecture, where the Showa Electric Aluminum Plant is located. When F is taken into the body over a long period of time, the bone structure changes as well as the teeth, and fluorosis occurs. The amount of fluoride causing osteosclerosis or osteoporosis is about 5.9 ppm 11.78 ppm. A large quantity of F interferes with the normal growth of children, whereas a small amount seems to enhance the growth. Children with third degree mottled teeth were small, but those with first degree were rather tall. In the Kita area, the atmospheric F content is 3-5 ppm within 2 km of the Showa Aluminum Plant, and F in the settling particles is 100-230 kg/sq km/mo. The control area 4-7 km from the pollution source has about 1/10th the F content in both atmosphere and settling particles. The average height of the children was slightly greater in the polluted area, and the growth rate per year was also greater in the same area. However, an X-ray examination of the right arm revealed that there was a slight delay of maturity of bones in the fifth and sixth graders. Among the junior high school pupils, the maturity of hand bones was slightly faster among the children from polluted areas.

**29049** **APTIC NO. 51022**

Tsuruta, Hiroshi, Mitsuo Sato, and Hiromichi Hasegawa

A BIOCHEMICAL EXAMINATION OF CARBON MONOXIDE POISONING. *(Issanka tanso chudoku no seikagakuteki kento). Text in Japanese. Preprint, Japan Society of Industrial Hygiene, p. 56-57, 1973. (Presented at the Japan Society of Industrial Hygiene, Annual Meeting, 46th, April 1973, Paper 128.)*

Seven-week old rats were exposed to 30 ppm or 200 ppm of carbon monoxide in 180-liter capacity exposure chambers and were compared with the control group. After a month-long continuous exposure, the rats were deprived of any food for 24 hr and then killed. The weights of organs and the body were measured. There was no weight difference between the two exposed groups and the control group either before the exposure, or during the first four weeks of the exposure experiment. There was a tendency among the exposure groups for a weight loss in the liver and the spleen, and a weight increase of the heart. Among the 30 ppm CO exposure group, there was no noticeable difference from the control group. There were slight increases of lactic acid, GOT, and liver microsome P-450. Among the 200 ppm CO exposure group, there was a tendency for increased hemoglobin, lactic acid, free cholesterol, phosphorus lipid, total glycerol, inorganic phosphoric acid, DNA and RNA of the brain, and liver microsome P450. Ester cholesterol, GABA in the free amino acid in the brain, and glutamine acid showed a decrease. There was no rise of blood sugar which had appeared in the acute poisoning of CO, and there was no change in the activities of plasma oxygen. Therefore, there was no metabolic system impairment in these exposure experiments.

**29050** **APTIC NO. 50680**

Valloton, M. N., M. Guillemin, and M. Lob

BLOOD LEAD AND DELTA AMINOLEVULINIC ACID DEHYDRATASE ACTIVITY OF A SAMPLE OF THE POPULATION IN LAUSANNE. *(Plombemie et activite de la dehydratase de l acide delta-aminolevulinique dans uns population lausannoise). Text in French. Schweiz. Med. Wochenschr., 103(15):547-550, 1973. 14 refs.*

Mean values of blood lead and delta-aminolevulinic acid dehydratase (ALA-D) activity were determined in a population of 186 blood donors in Lausanne, Switzerland. Ages varied from 19-74. Blood lead values for males and females were 22.4 and 19.1 micrograms/ 100 ml, respectively. The ALA-D exhibited a mean activity of .0184 units for males and .021 units for females. These results agreed well with levels usually observed for non-occupational exposure to lead. There was no significant correlation between lead and log ALA-D, nor had age any effect on these two parameters. A very significant difference appeared between males and females for both blood lead and ALA-D activity.

**29051** **APTIC NO. 50905**

Varga, Andras

PHYSIOLOGICAL EFFECT OF AIR IONS AND THEIR IMPORTANCE AS ENVIRONMENTAL FACTORS. *(Physiologische Wirkung von Luftionen and deren Bedeutung als Umweltfaktoren). Text in German. Naturw. Rundschau, 26(5):204-208, 1973. 27 refs.*

Through inhalation of ionized air the oxygen concentration of the blood rises in humans. Air ions not only have a static charge, but they form an electric current which may trigger a reaction at certain points of the organism. For this reason the electrical conductivity of the air and the ion density of the environment have biological importance. This is another reason to view the increasing air pollution susceptability.

**29052** **APTIC NO. 51010**

Yamaga, Ginro, Kaoru Omori, Takashi Tozawa, and Kazunori Abe

THE EFFECTS OF LOW-CONCENTRATION LEAD ON THE BODY. *(Teimodoen bakuro no seitai eikyo). Text in Japanese. Preprint, Japan Society of Industrial Hygiene, p. 300, 1973. (Presented at the Japan Society of Industrial Hygiene, Annual Meeting, 46th, April 1973, Paper 414.)*

The biological reaction of workers to environmental lead in a relatively low concentration was investigated among 97 workers in an electric wire manufacturing plant, with an additional 20 in a non-polluted area of the same plant. Workers in cable welding (environmantal lead 20-100 micrograms/cu m), soldering (5-40 micrograms/cu m), lead coating (10-50), melting (recycling) (25-120), and solvent plus soldering (0-35), and the control group workers were given blood chemistry and urine examinations. A significant decrease of globulin, hemoglobin, and hematocrit, were recognized among the workers in the recycling and melting process, where the lead concentration is relatively high, but no other workers showed such symptoms. A high index of delta aminolevulinic acid was noted in the welding, lead-coating, and melting groups. The lead content in the blood was within the range of 4.7-44.6 micrograms/dl and could not be considered abnormal; there was no correlation with ALA-dehydrase or with delta-ALA. The correlation between delta-ALA and ALA-dehydrase was studied; it was concluded that correlation was small when the delta-ALA index was low (less than 5 mg/l). Blood chemistry and urine delta-ALA had a relatively small effect with short term low-concentrations of lead in the environment.

**29053** **APTIC NO. 50422**

Yoshikawa, Kiyoshi

GASEOUS ENVIRONMENT AND THE LUNG SURFACE ACTIVITY. *(Kitai kankyo to hai hyomen kassei). Text in Japanese. Rinsho Kagaku (Clin. Chem.), 9(2):236-243, 1973. 19 refs.*

The technique of measuring lung surface activity has not been established, and according to the published data, the relationship between chronic bronchitis and the lung surface activity is not clear. Rather, among many factors causing chronic bronchitis, the most important is believed to be the gaseous environment. The most evident surfactants are oxidants, metal particles, toxic gases, dusts, and bacteria. Under the influence of oxidants, it is conjectured that the nonsaturate lipid acid is hydroxized in the lungs. Under an electromicroscope, 17 ppm of nitrogen dioxide administered to young rats causes the thickening of the lung base membrane and increase of fibrosis. An exposure of the rats to 2 ppm NO2 over two years will cause similar symptoms to epitherial bronchi and alveoli. No special effects of NO2 have been noted on the lung surface activity. Ozone increases the surface pressure of the lungs. Various laboratory experiments with ozone and lungs are discussed. Emphysema is caused by the loss of elastic recoil, which may be caused either by the loss of elasticity of the system itself, or by the loss of the surface tension. The relationship between emphysema and the surface tension is not clear; but the published data mention that alveolar hyperstability causes emphysema symptoms when the lung surface activity is high. Sulfur dioxide stimulates bronchi, and increases the secretion of surfactant, increasing the activity of the alveolar lining. The effects of smoking and dusts are also reviewed.

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**29054** **APTIC NO. 50573**

National Academy of Sciences, Washington, D. C., Committee on Biologic Effects of Atmospheric Pollutants

LEAD. AIRBORNE LEAD IN PERSPECTIVE. *Environmental Protection Agency Contract CPA 70-42, APTD-1289, 341p., 1972. 600 refs.*

The biologic effects of airborne lead are reviewed with respect to natural lead sources in the ecosystem, industrial emissions sources, the input and disposition of lead in man and its effects, the effects of lead on animals, analytical methods, and treatments for lead toxicity. The entity of severe clinical lead poisoning is manifested as effects on the central nervous system, the gastrointestinal system, the hematopoietic system, and the kidneys. In the most severe form, profound disturbances of the central nervous system are prominent and permanent brain damage may occur. In its mildest forms, lead poisoning is characterized by mild anemia, headaches, and generalized muscle aches.

**29055** **APTIC NO. 50916**

Japan Environmental Agency

POLLUTION DAMAGES TO HUMAN HEALTH AND COUNTERMEASURES. *In: Quality of the Environment in Japan. 1972, Chapt. 3, p. 105-113.*

The effects of air pollution on human health are reviewed. The most frequent diseases associated with air pollution are chronic bronchitis, bronchial asthma, asthmic bronchitis, and pulmonary edema. The occurrence of these diseases is associated with sulfuric acid mist and suspended dust particles. Nitrogen oxides, carbon monoxide, and photochemical smog are also associated with respiratory diseases. The toxicity of lead, fluorides, mercury, cadmium, and polychlorinated biphenyls was also discussed.

**29056** **APTIC NO. 50951**

Yatsushiro Municipal Council for the Investigation of Respiratory Diseases (Japan)

AN INVESTIGATORY REPORT ON THE CHILDREN S RESPIRATORY DISEASES IN YATSUSHIRO, 1972. *(Yatsushiro-shi jido kokyuki shikkan chosa hokoku, Showa 47-nendo). Text in Japanese. 23p., 1972.*

The respiratory diseases of children of Yatsushiro was investigated by questionnaires, health examinations, and clinical studies. The preliminary questionnaires were given to 1825 children of one school and 871 of another school, and detailed examinations were given to 116 children of one school and 111 of the other. The 1971 measurements of sulfur oxides in various parts of Yatsushiro were 0.78 to 1.99 mg/100 sq cm/mo, and settling particles were 7.53 to 11.81 tons/sq km/mo. The morbidity for typical asthma in two schools were 1.89% and 2.59% respectively; for atypical or light cases, 1.44 and 2.10%; for quasi-asthmatic diseases 3.33 and 4.69%; for asthmatic bronchitis approximately 2% for both; and for bronchitis over 1% and close to 2%. These figures are extremely high compared to the morbidity of Tokyo children (0.85%) and the children of Osaka Prefecture (1.0%). Air pollution in Yatsushiro is slightly lower than Fuji City or Kita-Kyushu city, but morbidity is close to that of Kita-Kyushu, which is 3.27%. The findings on allergen, acidocyte, and lung function were all better than those of allergic children in general. Seasonally, the morbidity in autumn was 60.5%, followed by spring, winter, and summer, and seems to follow the pattern of allergic morbidity. However, only 28.6% had an allergic family history.

**29057** **APTIC NO. 51008**

Bass, Harry

PULMONARY FUNCTION STUDIES: AID TO DIAGNOSIS FOR DYSPNEA. *Progr. Cardiov. Dis., 14(6):621-631, May 1972. 44 refs.*

Simple methods can be used to aid differential diagnosis between dyspnea due to heart failure and dyspnea due to chronic obstructive lung disease. These methods can quantify the magnitude of disability produced by chronic obstructive pulmonary disease and heart failure when both diseases coexist. In chronic obstructive lung disease, both the vital capacity and forced expiratory volume will be abnormally low and will not improve after diuretic therapy. In heart failure and coexisting lung disease, the vital capacity will be abnormally low but the forced expiratory volume will be normal or near normal due to improved elasticity afforded the lung by pulmonary congestion. After diuretic therapy, the vital capacity may or may not increase, although the forced expiratory volume will revert to a low level. When the disease producing dyspnea is not obvious by history or physical examination, measurement of vital capacity and forced expiratory volume can aid diagnosis if the measurements are repeated before and after a bronchodilator drug and before and after a therapeutic trial using a diuretic. Pulmonary function studies are simple to perform and repeat, are not hazardous for the patient, aid differential diagnosis, and lead to appropriate therapy for the relief of dyspnea.

**29058** **APTIC NO. 50966**

Belin, Lars

STUDIES OF BIRCH POLLEN ANTIGENS WITH SPECIAL REFERENCE TO THE ALLERGENIC PRINCIPLE. *Grana, 12(2):65-78, Dec. 19, 1972. 31 refs.*

Ten to fifteen antigens were demonstrated by immunodiffusion techniques in the water-soluble protein fraction of birch pollen employing immune serum from experimental animals. Only two of these antigens are highly allergenic to humans. These antigens were physiochemically more stable, had a lower molecular weight (around 20,000), and were more rapidly released from the pollen grains than the other antigens. Using immunofluorescence and micro-immunodiffusion techniques, release of the allergens was found to occur mainly through the pollen apertures. The allergens were easily mobilized to the pollen surface from underlying primary locations. Transmucosally immunized rabbits produced skin sensitizing reaginic antibodies preferentially against the allergenic antigens, while the antigens with low or no allergenic activity were more immunogenic than the highly allergenic ones when administered parenterally. All experiments, immunological and chromatographic methods, and procedures are described. (Author abstract modified)

**29059** **APTIC NO. 50655**

Bryce-Smith, Derek

BEHAVIOURAL EFFECTS OF LEAD AND OTHER HEAVY METAL POLLUTANTS. *Chem. Brit., 8(6):240-243, 1972. 45 refs.*

The behavioral effects of lead, manganese, and mercury are discussed. Short-term and long delayed effects of lead and mercury levels below the threshold of potential clinical poisoning were studied. Studies with cats, pigeons, rats, and the industrial exposure of humans have indicated that behavior and neuro-psychic disorders are influenced by these metals. Toxic mercury effects included self-consciousness, timidity, embarrassment with insufficient reason, anxiety, indecision, lack of concentration, depression, resentment of criticism, irritability or excitability. Present lead levels may influence the cell-division mechanism, morphological changes in brain structure, the rapid-eye-movement phase of sleep, and the nervous system. Long-term effects of lead exposure of children are reviewed.

**29060** **APTIC NO. 50443**

Chen, C., Shigeo Yamaoka, Osamu Fukase, Masanori Fukuda, and Michio Oka

EFFECTS OF POLLUTED URBAN AIR ON EXPERIMENTAL RATS (II), HISTOPATHOLOGIC FINDINGS IN LUNGS. *(Toshi osen taiki ni yoru dobutsu bakuro jikken (dainiho), kikan, hai no soshiki ni tsuite). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 195. (Nov. 7-9, Paper 150.)*

Experimental rats were raised for about 100 days in an especially polluted area of Osaka, a normally polluted area, and a control room with clean air. The lung and trachea were examined histopathologically after the period. The systems of the control group were normal. The group in the especially polluted area showed an increase of membrane epithelium, increase of mucous secretion, and inflammation of lymph cells under the membranes. The trachea of the group in the normally polluted area showed generally similar symptoms. The lungs of the very polluted area group showed abnormal development and separation of minute glands, pneumoconiosis, and lymphocytes aggressions of the bronchial membrane and layers under the membranes. Similar symptoms were recognized in the lungs of the group raised in the normally polluted area.

**29061** **APTIC NO. 50409**

Kashiwagi, Hideo, Kazuma Miyaji, Toru Takahashi, Yoichi Karimata, Kunihiko Fukushima, and Takeshi Okubo

THE PROCESS OF SO-CALLED YOKKAICHI ASTHMA - MAINLY ON THE LUNG FUNCTIONS. *(Iwayuru Yokkaichi zensoku no keika--hai o chushin to shite). Text in Japanese. Nippon Kyobu Shikkan Gakkai Zasshi (Japan. J. Thoracic Dis.), no. 11:73, 1972. (Presented at the Meeting on Air Pollution, April 5, 1972.)*

Fourteen obstructive lung patients who were presumably affected by Yokkaichi air pollution since June 1965 were hospitalized and observed for 7 yr. The immediate effects of clean air rooms 3 mo after the hospitalization were a 70% recovery rate for asthmatic and chronic bronchial patients and an improvement on the lung function in general; but no improvements were noted among the patients who had had asthma and emphysema before air pollution appeared in Yokkaichi. The results of more than 3 yr of hospitalization indicated a 50% decrease of asthmatic attacks and a slight increase of lung capacity, the lung clearance remained almost the same. Five deaths occurred during this period, and in all cases, a decrease of lung capacity and the second capacity, and a clear increase of residuals were noted. The decrease of lung clearance (residue exceeding the second capacity and the lung capacity) and the second capacity not reaching 1000 ml both signified a dangerous state.

**29062** **APTIC NO. 50562**

Kustov, V. V., V. I. Belkin, B. I. Abidin, O. F. Ostapenko, A. N. Malkuta, and L. T. Poddubnaya

A CONTRIBUTION TO THE CARBON MONOXIDE-INDUCED CHRONIC POISONING IN YOUNG ANIMALS. *(K voprosu o khronicheskoy oksiuglerodnoy intoksikatsii u molodykh zhivotnykh). Text in Russian. Gigiena Truda i Prof. Zabolevaniya, no. 5:50-52, 1972. 10 refs.*

Albino rats with body weights ranging from 120 to 150 g were exposed to 0.053 + or 0.005 mg/l of carbon monoxide over 30 days. The follow-up examination revealed retarded growth in terms of body weight, but practically no change in the oxygen consumption compared to a control group. Erythrocytosis, increased hemoglobin level, blood carboxyhemoglobin level within the physiological range with 1.12-1.31%, decreased blood catalase level between the 10th and 20th days of the experiment, statistically significant inhibition of the hepatic cytochrome oxidase, and activation of the hepatic succinate dehydrogenase were determined. A follow-up acute poisoning test revealed increased tolerance of rats from the chronic experiment to high CO concentrations compared to a control group.

**29063** **APTIC NO. 50474**

Macovschi, Eugen

BIOSTRUCTURE AND METABOLIC ENERGY OF THE CELL - FROM THE POINT OF VIEW OF THE POLLUTION OF THE ENVIRONMENT. *(Biostruktur und Stoffwechselenergie der Zelle - vom Standpunkt der Umweltvergiftung). Text in German. Preprint, Inst. for Biochemistry, Bucharest (Romania), 6p., 1972. 2 refs. (Presented at the International Convention on Civilization Diseases, Nutrition, Environment, and Living Conditions, 18th, Berlin, West Germany, Sept. 16-23, 1972.)*

The toxins which are polluting the air water, and ground in ever-increasing quantities are now penetrating living organisms. Some such toxins are capable of reducing the formation of energy in the cells by restricting the supply of oxygen (e.g., carbon monoxide in motor exhaust gases) or by slowing up certain biochemical processes (e.g., metabolism inhibitors, lead compounds). As the normal behavior and existence of biostructural matter requires a certain supply of metabolic energy, this involves partial decomposition of the biostructure, which brings about a change in the control of biochemical processes and the appearance of pathological conditions. The incorporation of such toxins in the biostructure can even lead to an irreversible transition of the cells from the aerobic to the anaerobic mode of life. These observations are supported by tests carried out with metabolism inhibitors on living plant and animal tissues.

**29064** **APTIC NO. 50408**

Matsuoka, Atsuo, Shohei Watanabe, and Hideo Katsuki

CASES OF MALIGNANT LUNG TUMORS AMONG ICHIHARA CITY RESIDENTS. *(Ichihara-shi (Keiyo kogyo chitai) jumin no hai akusei shuyo no hassei). Text in Japanese. Nippon Kyobu Shikkan Gakkai Zasshi (Japan. J. Thoracic Dis.), no. 11:73, 1972. (Presented at the Meeting on Air Pollution, April 5, 1972.)*

Since 1958, tubercular patients in Ichihara have been examined for the purpose of studying carcinogenesis and lung tumor progress. There has been no evidence of characteristic increases of lung cancer or lung tumor cases in polluted areas compared with non-polluted areas. Some clinical observations were reported at the meeting.

**29065** **APTIC NO. 50444**

Mizoguchi, Isao

PHOTOCHEMICAL SMOG. *(Kokagaku sumoggu). Text in Japanese. Honkenfu Zasshi (Japan. J. Pub. Health Nurse), 28(7):70-72, July 10, 1972.*

Examinations of the records of recent occurrences of photochemical smogs seem to indicate that 100-85% of the people felt eye irritation and pain; 70-50% had coughs and continuous coughs; 70-30% had breathing difficulty and a suffocating feeling; 50-30% had throat pain; 50-20% felt fatigue and discomfort; 30-20% felt chest pain; various people smelled odors; and 15-5% had numbness in the limbs. Ozone can be smelled when the concentration is 0.02-0.05 ppm; irritation is caused in the nose and throat at 0.1-0.3 ppm (in several minutes); a long term exposure to over 0.2 ppm will increase the morbidity of chornic bronchitis; 0.5-1 ppm will increase air passage resistance and oxygen consumption; 1-2 ppm will cause exhaustion, heavy head; 10 ppm will cause breathing difficulty, emphysema, and coma; 15-20 ppm can cause death in 2 hours after the effects of emphysema on the lungs and heart; over 1000 ppm will probably cause death in several minutes. Various people react differently to various concentrations of oxidant, ozone, acrolein, and formaldehydes. The sensitivity and reaction can also vary depending on the condition of the people at the time of occurrence. Usually acute symptoms are brought about as a result of hard physical movement such as activities in the playground or gym classes.

**29066** **APTIC NO. 50949**

Oyama, Masaru

AIR POLLUTION AND UPPER RESPIRATORY TRACT. *(Taiki osen to jokido). Text in Japanese. Nihon Jibi Inkoka Gakkai Zasshi (Jap. Otolaryngol.), vol. 7:278-279, 1972.*

The upper respiratory tracts of pupils of grade schools and junior high schools in Tsu were examined, and the morbidity of pharynx, rhinitis, and olfactory disorders were found to be higher in polluted areas than in non-polluted areas. The morbidity of tonsilitis and sinusitis was significantly higher in polluted areas, especially in schools with high rate of pupils complaining of olfactory sense damage. The above-40-year-old residents of polluted areas were examined; the rate of diseases in the upper respiratory tract was higher than that in the lower tract. The conditions of sinusitis and olfactory function impairment were examined in 32 inhabitants from non-polluted areas, 28 from polluted areas, and 20 persons who were diagnosed to be air pollution victims. The detailed studies with rhinoscope, X-ray, and olfactory tests showed no significant difference among the areas. However, while a high percentage of normal olfactory reactions were found in the non-polluted areas, the scores in polluted areas were either extremely low or extremely high. Such extraordinary insensitivity and sensitivity were noted especially among patients diagnosed as air pollution victims. Among the 20 cases, 14 had sinusitis together with other respiratory diseases, and eight of them had low scores in the olfactory test. Among normal healthy persons, only one out of six showed such a low score. This phenomenon suggests a close relationship between olfactory damage and sinusitis. In a sulfur dioxide exposure test (5 ppm), a lower threshold was noted among sinusitis patients. Mice were exposed to 0.03-0.1 ppm SO2 for 2 mo and the respiratory tract was studied. The air passage mucous membrane showed a clear morphological and functional transformation, which suggested the lowering of resistance against various virus and external stimulations.

**29067 APTIC NO. 50582**

Pavlenko, S. M.

ON SEVERAL REGULARITIES OF THE EFFECT OF INDUSTRIAL NON-ELECTROLYTE POISONS TAKEN INTO THE ORGANISM ALONG WITH WATER AND AIR. *(K voprosu o nekotorykh zakonomernostyakh deystviya promyshlennykh yadrov-neelektrolitov, postupayushchikh v organizm odnovremenno s vodoy i vozdukhom). Gigiena i Sanit., 37(1):40-44, Jan 1972. 7 refs. Translated from Russian, 10p.*

The nature and characteristics of the complex effect of organic industrial materials, including ethyl and methyl alcohols, cyclohexanol, and benzene, on the organism were studied. Threshold and inert concentrations in the air of work areas and in reservoir waters were measured, and does of the maximum permissible concentrations of each substance were tested on rats. Each substance was also tested at the threshold level, the inert level, and the revised maximum allowable concentration level. The threshold doses had a pronounced effect on the central nervous system: the latent period to a positive stimulus increased; and the strength of the reflexes decreased. Changes were also noted in the blood, disturbances to the oxidation reduction process, and the albumin-producing function of the liver. The toxicity during complex administration changed unidirectionally and was subject to the effect of summation.

**29068 APTIC NO. 51024**

Peterson, Jack E. and Richard D. Stewart

HUMAN ABSORPTION OF CARBON MONOXIDE FROM HIGH CONCENTRATIONS IN AIR. *J. Am. Ind. Hyg. Assoc., 33(5):293-297, May 1972. 5 refs.*

Six healthy males were exposed to carbon monoxide concentrations ranging from 1000 ppm to 35,600 ppm for periods of controlled duration and the rate of rise of carboxyhemoglobin concentrations in the blood was determined. The experimental procedure is described. The rate of increase was accurately predicted by the relationship log (% COHb/l) equals 1.036 (ppm CO inhaled) minus 4.4793. This relationship was used to determine the carbon monoxide absorbed in brief exposures to high concentrations. (Author abstract)

**29069 APTIC NO. 50968**

Pooley, F. D.

ASBESTOS BODIES, THEIR FORMATION, COMPOSITION AND CHARACTER. *Environ. Res., 5(4):363-379, Dec. 1972. 14 refs.*

Asbestos bodies extracted from human lungs were examined under the electron microscope to determine their morphology and diffraction characteristics. The asbestos bodies were extracted from the lungs of persons exposed to the four types of commercial asbestos fiber, namely cocidolite, amosite, anthophyllite, and chrysotile. Asbestos bodies were rarely found with fibers less than 10 micron in length, and practically always on straight fibers. They occurred with all four commercial varieties of asbestos but less frequently with chrysotile fibers. The characteristics of the individual fibers played a large part in determining the range and frequency of body shapes observed. There appeared to be no evidence to suggest stepwise formation of asbestos bodies. Asbestos bodies had a major crystalline component which was structurally similar to extracts of ferritin produced from animal and human organs. The material forming the asbestos body was definitely biological in origin and corresponded closely to the material defined in the medical literature as hemosiderin. (Author abstract)

**29070 APTIC NO. 50594**

Ryazanova, R. A., V. A. Druzhinina, and V. V. Nevstruyeva

EXPERIMENTAL DATA FOR THE ESTABLISHMENT OF MAXIMUM PERMISSIBLE CONCENTRATION OF ZINEB IN FACTORY AIR. *(Eksperimentalnye materialy k obosnovaniyu predelno dopustimoy kontsentratsii tsineba v vozdukhe rabochikh pomeshcheniy). Gigiena i Sanit., 7(8):42-45, Aug. 1972. 3 refs. Translated from Russian, 8p.*

The effect of zineb on mice, rats, rabbits, and guinea pigs was investigated to determine preliminary data for establishing maximum allowable concentration standards for factory environments. The biological effect in single and chronic application through intact skin and respiratory organs was studied. Chronic application in concentrations of 200 and 20 mg/cu m for 5 mo decreased cholineasterase activity, the amount of SH-groups, weight rations of internal organs, and the amount of radioactive phosphorus included by tissues and changed the generative function. Based on the toxicological indices, including the embryo and ganodotoxic effects, the maximum permissible concentration of zineb in factory air was established at 0.5 mg/cu m.

**29071 APTIC NO. 50852**

Shimada, Tetsuo, Takeshi Kitamura, Toshiro Kaneko, and Osamu Iizumi

INVESTIGATION OF THE EFFECT OF AIR POLLUTION ON SCHOOLCHILDREN IN THE FUJI DISTRICT, SHIZUOKA PREFECTURE--RHINOSCOPY AND SENSITIVITY TESTS. *(Shizuoka-ken Fuji chiku ni okeru gakudo no taiki osen eikyo chosa biryo shoken to kyukaku kensa kara). Text in Japanese. Nihon Jibi Inkoka Gakkai Kaiho (Jap. J. Nephrol.), 70(10):1201-1203, 1972.*

The children at two schools in heavily polluted areas and three schools in a control area of Fuji city were given rhinoscopic examinations and questionnaires in June 1970 and Oct. 1971. Odor sensitivity tests were also given in 1971 with dl-camphor, gamma-undecalactone, and isovaleric acid. A high percentage of chronic sinusitis was found in polluted schools, though statistically there was no significant difference. There was no real difference for chronic rhinitis in 1970, but a higher morbidity was found in 1971 in polluted schools. For both years, high percentages of allergic rhinitis were found in polluted schools but not significantly. There was a significant difference only between the control schools and the more polluted of the two schools. A higher threshold index for low concentration dl-camphor was found in polluted schools, but for higher concentrations, the children of polluted schools showed a significant over-sensitivity. With gamma-undecalactone, polluted schools showed a lower threshold. The two groups showed no different reaction to isovaleric acid. The asthmatic morbidity parallels with the concentration of sulfur dioxide in the area. The average frequency of asthma at the two polluted schools was 2.34%, approximately three times higher than the average of control schools.

**29072 APTIC NO. 51021**

Stebbings, James H., Jr.

A SURVEY OF RESPIRATORY DISEASE AMONG NEW YORK CITY POSTAL AND TRANSIT WORKERS. III. ANTHROPOMETRIC, SMOKING, OCCUPATIONAL, AND ETHNIC VARIABLES AFFECTING THE FEV1 AMONG WHITE MALES. *Environ. Res., 5(4):451-466, Dec. 1972. 18 refs.*

A report of the New York City survey of respiratory disease among postal and transit workers is presented. A detailed analysis of anthropometric, smoking, occupational, ethnic, and miscellaneous factors affecting the 1-second forced expiratory volume (FEV1) among white males aged 30-59 is given. The analysis was undertaken to identify variables to be taken into account in a future study of the effects of air pollution on the FEV1 in these two occupational populations. The methodology of the study is described, including: selection of individuals for analysis, pulmonary function measurement, statistical methods used, the determination of anthropometric variables, and smoking variables. Noninhaling of tobacco smoke and the use of filter cigarettes did not appear to reduce the rrate of decline of the FEV with age among smokers. The cumulative benefit of not smoking in late adolescence and early adult life appeared to be permanently retained despite later smoking. Workers from Puerto Rico showed lower values for the FEV1 than other foreign or native-born workers. A possible effect of occupational exposure to air pollution among nonsmoking bus drivers was found. A number of smoking variables beyond current type and amount were shown to contribute to the prediction of the FEV1. It was suggested that these, and also sitting height and weight, should be accounted for in the analyses of air pollution on pulmonary function. The use of age and standing height in predicting the FEV1 for mass screening purposes was shown to be only 90% as sensitive as the use of age, standing height, sitting height, and weight. (Author abstract modified)

**29073** **APTIC NO. 50514**

Tibaldi, Ettore

SULFUROUS ANHYDRIDE. *(L anidride solforosa). Text in Italian. Inquinamento, 14(9):36-37, Nov. 1972. 12 refs.*

Exposure to 0.1 ppm sulfur dioxide for 1 mo increases morbidity, and exposure to the same concentration for 1 yr or somewhat longer significantly increases mortality in humans and in animals. Such levels are not rare and periodic tests have confirmed them in many industrial and adjacent regions in Italy. Recently a correlation was found between the volume of human expectorate and atmospheric humidity and temperature. But the quantity of the expectorate diminishes with decreasing SO2 concentration and that of suspended particulates in the atmosphere. A correlation was also found between the incidence of bronchitis and levels of SO2 in non-smoking females older than 65 years residing in industrial, residential, and suburban zones of Genoa. In the light of these findings many of the maximum permissible concentrations in various countries are too high, including Italy. Even an average annual concentration between 0.03 and 0.09 ppm coupled with 185 micrograms/cu m suspended particulates will increase significantly morbidity in aged humans.

**29074** **APTIC NO. 50410**

Ueda, Naoki

AIR POLLUTION AND CHILDREN S ASTHMA. *(Taiki osen to shoni zensoku). Text in Japanese. Nippon Kyobu Shikkan Gakkai Zasshi (Japan. J. Thoracic Dis.), no. 11:73, 1972. (Presented at the Meeting on Air Pollution, April 5, 1972.)*

The effects of air pollution in Asahigawa on the respiratory system of the children in elementary and junior high schools were investigated by the British Medical Research Council questionnaire and published material on the asthmatic children in Asahigawa. Generally, the children of polluted areas had more serious respiratory disturbances than those in non-polluted areas. About 1.01% of the elementary school children and 0.59% of junior high school pupils were diagnosed as asthmatic by various medical authorities, with the highest number among the first graders and gradual decreases among higher graders; there is a slight increase among the freshmen in junior high schools. The attack frequency is slightly higher among the children in polluted areas, and their cases are more serious than those in non-polluted areas. The relationship between the attacks and the sulfur dioxide concentration and settling particles was not clear, but the attacks seemed to increase slightly after the increase of the SO2 level.

**29075** **APTIC NO. 50684**

Wada, Teruhiko and Otohiko Takayama

STUDIES ON THE CHRONIC PHARYNGITIS IN POLLUTED AREAS. SMOKING AND AIR POLLUTION. *(Taiki osen chiku ni okeru mansei intoen no kenkyu. Taiki osen to kitsuen). Text in Japanese. Nihon Jibi Inkoka Gakkai Kaiho (Jap. J. Nephrol.), 70(10):1200-1201, 1972.*

The differentiation of the effects of air pollution and smoking on pharyngitis, and the degree of effects were investigated by questionnaires and examinations. A total of 492 people (273 male; 219 female) were examined; 194 were smokers and 298 were nonsmokers. Sixty six percent of male were smokers and only 6% of female were smokers. Fifty percent of all smokers smoked 11-20 cigarettes a day; 32% smoked 1-10, and 18% smoked more than 21. The age groups of smokers were, from the largest, 40s, 30s, 50s, 20s, and 10s. There was no seasonal difference in the frequency of hospital visits among smokers, but non-smokers visited hospital most frequently in spring, then summer, autumn, and then winter. This phenomenon paralleled with the degree of air pollution, which was heaviest in spring, and lowest in winter. Air pollution had no significant effect on the difference in autonomic imbalance, but smoking had. There was a greater tendency of imbalance among smokers compared to nonsmokers. Conscious symptoms such as coughing, sputum, and a swollen feeling in the throat among the smokers were intensified in higher pollution, but the effect of smoking was not clearly recognizable in the external examination.

**29076** **APTIC NO. 50407**

Yoda, Hiroshi, Kanichi Yagawa, and Morio Sudo

THE EFFECTS OF SULFUR DIOXIDE EXPOSURE ON THE RESPIRATORY SYSTEM. REPORT NO. 1: PATHOLOGICAL AND MORPHOLOGICAL CHANGES OF THE RESPIRATORY SYSTEM OF MICE AFTER A LONG TERM EXPOSURE TO LOW- CONCENTRATION SULFUR DIOXIDE GAS. *(Aryusan gasu bakuro no kokyuki ni oyobosu eikyo. Daiipo: Teinodo aryusan gasu choki bakuro ni yoru mausu kokyuki no byorikeitaiteki henka). Text in Japanese. Nippon Kyobu Shikkan Gakkai Zasshi (Japan. J. Thoracic Dis.), no. 11:73, 1972. (Presented at the Meeting on Air Pollution, April 5, 1972.)*

Three groups of 6-week-old female mice were exposed to low concentration sulfur dioxide (0.05, 0.15, and 0.23 ppm respectively) for three months, and the weight changes were examined. The trachea and lung models were made and pathologically and morphologically compared with the control group. No weight differences were noted between the exposed and control groups. Two mice died in the exposed group. Histologically, squamatization of trachea mucous membranes, the decrease of cilia, alveolar infiltrations, congestion of lungs, and lung hemorrhages were recognized in both groups, but there was no significant differences as to the frequency, degree of area of these damages. Three bronchial pneumonia cases developed in each of the three exposure groups, and none in the control group.

## 1971

**29077** **APTIC NO. 50785**

Isakova, G. K., B. Ya. Ekshtat, and Yu. Ya. Kerkis

ON STUDIES OF THE MUTAGENIC PROPERTIES OF CHEMICAL SUBSTANCES IN THE ESTABLISHMENT OF HYGIENIC STANDARDS. *(Ob izuchenii mutagennogo deistviya khimicheskikh veshchestv pri gigienicheskom normirovani). Hyg. Sanit. (English translation from Russian of: Gigiena i Sanit.), 36(11):178-184, 1971. 10 refs.*

The action of dimethylamine (0.05 and 1 mg/cu m), triethylamine (1 and 10 mg/cu m), and ethylene chlorhydrin (1 and 10 mg/cu m) on the chromosome apparatus of the bone marrow cells of rats was studied. The first two compounds increased the incidence of aneuploid cells from 2% in the control group up to 18-24% in the test and produced structural changes in chromosomes. In the action of ethylene chlorhydrin there was a greater number of cells with structural changes of chromosomes and delayed mitosis. Studies were done to standardize the amounts of the chemical substances in the environment.

**29078** **APTIC NO. 50782**

Rumyantsev, G. I. and T. A. Kozlova

SOME RESULTS OF STUDIES OF COMBINED EFFECTS OF TOXIC SUBSTANCES. *(Nekotorye itogi izucheniya sovmestnogo deistviya toksicheskikh veschestv na organizm). Hyg. Sanit. (English translation from Russian of: Gigiena i Sanit.), 36(10):44, 1971.*

Studies of combined effects of toxic substances on animals are reviewed. These studies were carried with a variety of concentrations, ranging from the effective to the maximum permissible concentrations, and using various methods of administration, including intragastrically, by inhalation, and percutaneously. Physiological, biochemical, histological, and histochemical methods were used to analyze effects. The animals were tested for the functional state of their nervous system, metabolism, and natural immunity. Current investigations are mentioned.

## 1970

**29079** **APTIC NO. 50576**

Crocker, T. Timothy, Thomas V. O Donnell, and Lora L. Nunes

RESPIRATORY EPITHELIAL LESIONS PRODUCED BY BENZO(A)PYRENE OR AN AIR POLLUTION EXTRACT IN TRACHEOBRONCHIAL MUCOSA FROM PERINATAL HAMSTERS, DOGS AND MONKEYS AND FROM ADULT HUMAN SUBJECTS IN ORGAN CULTURE. *Preprint, American Medical Assoc., Chicago, Ill., 36p., 1970. 9 refs. (Presented at the Air Pollution Medical Research Conference, New Orleans, La., Oct. 5, 1970.)*

The effects of benzo(a)pyrene and benzene-soluble extracts on tracheobronchial structures of suckling rats, hamsters, fetal dogs, and monkeys were investigated. The experimental materials and methods, culture media, sources of explants, tests, and analytical results are examined. The effects on adult human bronchial mucosa were also studied. Cytotoxicity was more common and simulation of replication was less common in adult human tissue than in perinatal animal tissue. Both the benzo(a)pyrene and the air pollution extracts had toxic and carcinogenic effects on the respiratory tissue.

**29080** **APTIC NO. 50587**

Groetenbriel, C., W. van Ganse, and J. Oleffe

A CASE OF CHRONIC BERYLLIUM INTOXICATION: PATHOGENIC CONSIDERATIONS AND DIAGNOSTIC VALUE OF THE PATCH-TEST. *(A propos d un cas d intoxication chronique au beryllium: considerations pathogeniques et valeur du patch-test pour le diagnostic). Acta Tuberc. Pneumol. Belg., vol. 61:363-376, May-Aug. 1970. 24 refs. Translated from French, 17p.*

A case of chronic intoxication in a technician exposed to beryllium oxide was examined. The diagnosis was based on his occupational history, radiological tests, and a positive patch test with beryllium fluoride. The symptoms of sarcoidosis and chronic beryllium intoxication are very similar, supporting the hypothesis that the tissue reactions induced by beryllium compounds are immunological reactions of the delayed type. The carcinogenetic effect of beryllium in several animal species was also discussed.

## 1969

**29081** **APTIC NO. 50586**

Gelfor, I. A. and A. A. Orlova

SOME CLINICOBIOCHEMICAL PARALLELS IN BERYLLIOSIS. *(Nekotorye kliniko-biokhimicheskie parallelі pri berillioze). Klinich. Med., 47(6):73-78, June 1969. 4 refs. Translated from Russian, 11p.*

The dynamic content of blood protein fractions was measured in relation to complications of berylliosis and treatments of patients with glucocortoids. Depending on the stage of progression of berylliosis, a progressive increase in total protein and gamma-globulins was noted. When berylliosis was complicated by inflamations, the amount of alpha-globulins also increased. Under the influence of glucocortoids, clinical and roentgenological improvement was accompanied by decreases in the amount of total protein and gamma-globulins.

**29082** **APTIC NO. 50588**

Konchalovskaya, N. M. and K. V. Glotova

CHRONIC PULMONARY HEART IN SILICOSIS, BERYLLIOSIS AND CHRONIC DUST BRONCHITIS. *(Kronicheskoe legochnoe serdtse pri silikoze, berillioze i khronicheskom pylevom bronchite). Klinich. Med., 47(5):16-20, May 1969. 19 refs. Translated from Russian, 9p.*

The frequency, characteristics, and development of cardiac changes in patients with silicosis, berylliosis, and chronic dust bronchitis were studied. The symptom complex of chronic pulmonary heart was the most important factor in 17% of the cases of silicosis, 18% of the chronic bronchitis cases, and 33% of the berylliosis cases. The development of pulmonary heart and the attendant pulmonary hypertension were most frequently associated with the degree of functional disturbance of external respiration and were dependent to a lesser degree on pneumofibrosis. An aggravating factor in cardiac pathology was bronchopulmonary infection which had a toxic effect on the myocardium. In berylliosis, pronounced hypertrophy of both cardiac ventricles was determined, apparently due to the significant increase in the systolic volume of the heart, hypoxemic hypoxia of the myocardium, and primary myocardial dystrophy, associated with disturbed protein metabolism peculiar to berylliosis.

## 1966

**29083** **APTIC NO. 50590**

Potapova, I. N. and N. I. Seleznev

ELECTRON MICROSCOPY STUDY OF INITIAL CHANGES IN EXPERIMENTAL BERYLLIOSIS. *(Elektronnomikroskopicheskoe issledovanie nachalnykh izmeneniv pri eksperimentalnom berillioze). Byul. Eksperim. Biol. i Med., 62(6):108-109, Dec. 1966. 4 refs. Translated from Russian, 4p.*

Electron microscopy was used to study the effect of beryllium oxide on the lung tissue of white rats 1-4 days after its intratracheal administration. Dust particles measuring 2 micron exerted a toxic action on the lung tissue, settled in the alveoli, and were intercepted by the basal membrane of the alveolar septi. The basal membrane was then incapacitated as a barrier, permitting free movement of cells and the resulting development of beryllium pneumonitis.

### 1965

**29084** **APTIC NO. 50615**

Berard, J.

PLEURISY DUE TO CHLORINE POISONING. *(Pleuresie par intoxication au chlore). J. Franc. Med. Chir. Thorac. (Paris), vol. 19:87-90, 1965. Translated from French, 5p.*

Parallel to acne, serofibrinous pleurisy developed in a patient with a history of occupational chlorine poisoning. The case history, symptoms, development of the disease, diagnostic procedures, and treatment are reviewed. Based on negative results for the tuberculin test, parasitological examinations, and blood tests, the cause of the disease was established as accidental chlorine poisoning due to 2-4-5-trichlorophenol.

### 1958

**29085** **APTIC NO. 50616**

Laciak, J. and K. Sipa

THE IMPORTANCE OF TESTING THE OLFACTION OF WORKERS IN SOME BRANCHES OF THE CHEMICAL INDUSTRY. *(Znaczenie badania wechu u robotnikow w niektorych galeziach przemyslu chemicznego). Med. Pracy (Warsaw), 9(2):85-90, 1958. 7 refs. Translated from Polish, 10p.*

## EFFECTS-PLANTS AND LIVESTOCK

### 1973

**29086** **APTIC NO. 50677**

Garber, K.

THE DIFFERENTIAL DIAGNOSIS OF FLUORIDE DAMAGE TO PLANTS. *Fluoride Quarterly J. Intern. Soc. Fluoride Res., 6(1):33-40, Jan. 1973. 30 refs. (Presented at the International Society for Fluoride Research, Annual Conference, 4th, Hague, Netherlands, Oct. 24-27, 1971.)*

Fluorides, sulfur dioxide, hydrochloric acid, chlorine, nitrogen dioxide, ammonia, tar fumes, and ozone are toxic to plants. Not all symptoms point to the effect of a particular pollutant. For the diagnosis of plant damage caused by air pollutants, the most important criterion is the chemical analysis of leaves in conjunction with the examination by ultraviolet light of quartz lamps and the analysis of air and rain water. (Author abstract modified)

**29087** **APTIC NO. 50729**

Reusmann, G. and J. Westphalen

AUTOMATIC DETERMINATION OF LEAD, ZINC, CADMIUM AND COPPER IN PLANT MATERIALS BY STRIPPING VOLTAMMETRY. *(Automatische Bestimmung von Blei, Zink, Cadmium und Kupfer in Pflanzenmaterial durch Inversvoltammetrie). Text in German. Z. Anal. Chem., 264(2):165-167, 1973. 4 refs. (Presented at the Tagung Euroanalysis I, Heidelberg, West Germany, Aug. 8-Sept. 1, 1972.)*

During the automatic determination of lead, zinc, cadmium, and fluoride in plants by stripping voltammetry, the ashed plant material is fused with sodium hydroxide. Afterwards hydrochloric acid and citric acid is added, and a pH value of 3.7 is adjusted. For the determination of copper, the sample is acidified with perchloric and citric acid. Then a pH value of 2.7 is adjusted. It is possible to carry out several determinations of lead in plant materials with only one drop of mercury. The limit of detection is 1-3 ppm.

**29088** **APTIC NO. 50415**

Yamazoe, Fumio

INJURY TO PLANTS EXPOSED TO FLUORIDES. *(Fukkabutsu ni yoru shokubutsu higai to sono jittai). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 9(4):331-338, April 1973. 6 refs.*

Fluoride emission sources, emission standards, plant damage, plant resistance, damage factors, damage characteristics and mechanisms, the evalution method for F damage, and the control or attenuation method for F damage are discussed. Plant leaves which absorbed fluoride generally turn yellow on the tips and around the edges; when the roots absorb F, a slighter degree of discoloration and withering occur. Silicicolous plants such as rice and wheat form a compound of silicon and F which is relatively insoluble, and calcicolus plants such as soybeans and colza seed form a compound of calcium and F which is also insoluble. These compounds stay in fixed locations. Toxic hydrogen fluoride solutions destroy the cell system and do not transfer to other locations. They usually damage the metabolism; evaporation of water increases temporarily and then decreases; chlorosis occurs and further develops into necrosis; thee respiration increases temporarily but gradually decreases; the assimilation of carbon and nitrogen decreases; and the balances of various elements are completely destroyed. The control or attenuation methods for F damages are: the use of an evaporation control agent such as water, lime emulsion, or OED; cultivation of other species with a greater resistance against F damages; improvements of fertilizer and care, avoiding nitrogen fertilizers and replacing them with potassium fertilizers; and planting a buffer area with smoke-resistant trees such as camillia, acacia, or phoenix trees.

### 1972

**29089** **APTIC NO. 50780**

Dept. of Agriculture, Forest Service

OUR AIR: UNFIT FOR TREES. *NE-INF-14-72 REV, 23p., 1972.*

Major sources of air pollution, pollutants, and their effects on trees are reviewed. Effects depend on type of tree, genetic make up, stage of growth, nearness to pollutant source, pollutant concentration, and the pollutant duration. A list is presented which includes the known responses of both hardwood and softwood trees to sulfur dioxide, hydrogen fluoride, ozone, nitrogen oxides, peroxyacetyl nitrate (PAN), ethylene, chlorine, hydrogen chloride, and mercury vapor.

**29090** **APTIC NO. 50959**

Kerin, D.

ANALYSIS OF THE CONCENTRATION OF TRACE SUBSTANCES IN PLANTS IN THE FIELD OF ENVIRONMENTAL POLLUTION. *(Die Bewertung des Spurengehaltes der Pflanzen auf dem Gebiet des Umweltschutzes). Text in German. Proc. Simp. Int. Agrochim. Fitonutriz. Oligominerale, Punta Ala, Italy, 1972, p. 283-288. 5 refs. (Oct. 2-6.)*

Plants and soil samples taken in the vicinity of metallurgical plants were analyzed by spectrophotometry and atomic absorption. The iron concentration is spruce and pine needles from the vicinity of a steel plant ranged from 200 to 700 mg

Fe/kg dry substance. More than 40% of the examined samples had an iron concentration of 400 mg/kg or higher. The iron concentration in needle samples from a non-industrial area ranged from 65 to 190 mg Fe/kg dry substance. Iron and manganese concentrations of needle samples from the vicinity of a steel plant were considerably higher than from an non-industrial environment. The same is true for sulfur and fluorine. The lead concentration of pine needles from non-industrial area measured 3 mg Pb/kg. In the vicinity of a lead plant concentrations of up to 1100 mg Pb/kg were measured. The lead concentration of hay measured 1700 g Pb/kg, in non-industrial areas the average concentration measured was 5.26 mg/kg. Other examples are discussed concerning zinc.

**29091** **APTIC NO. 50691**

Kirschbaum, U.

**MAPPING OF NATURAL GROWTH OFLICHENS.** *In: Lufthygienisch- meteorologische Modelluntersuchung in der Region Untermain. 4. Arbeitsbereicht. Regionale Planungsgemeinschaft Untermain, Frankfurt am Main (West Germany), p. 76-80, Oct. 1972.*

The large-area distribution of pollution was studied with the aid of lichens. The lichen growth on 10 apple trees was examined in the neighborhood of 150 stations spread uniformly over the area. Each tree was fitted with a wire mesh extending from 0.30 to 1.30 m above ground level. How many species of lichens grew in the 40 squares of the wire mesh, covering rate, and vitality were studied. With these data a lichen index was calculated for each station which provides information on the emission rate. For the computation the formula by Le Blanc was used, by this the index of atmospheric purity was obtained by multiplying the toxic tolerance factor of each species by the frequency, covering rate, and vitality of each species. The obtained data were plotted in a map and those areas showing similar indices were combined into emission load zones. In the area of Frankfurt and in a stretch extending northeast to Bad Vilbel no lichens grew. It is the area most heavily polluted. Circular around this area was a zone with lichen indices between 1 and 45 Lichens could not exist at all at concentrations between 0.14 and 0.09 mg/cu m of sulfur dioxide.

**29092** **APTIC NO. 50764**

Mitsugi, Isho and Yoshihiro Nakagawa

**RAPID ANALYSIS OF BROMINE IN TREE LEAVES BY THE FLUORESCENE X-RAY METHOD.** *(Keiko X-sen-ho ni yoru jumoku yochu shuso no kan i jinsoku bunseki). Text in Japanese. Hyogo-ken Kogai Kenkyusho Kenkyu (Rept. Public Nuisance Res. Inst., Hyogo Prefect.), no. 4:25-26, Dec. 1972. 6 refs.*

A method for the determination of bromine in tree leaves by the fluorescence X-ray technique is reviewed. The complete equipment, operating procedure, sample preparation, and analytical technique are examined. Selenium was used as the internal standard. The determination of the ratio between the peak intensity of the BrK(alpha) line and the background intensity of the continuous X-ray gave accurate results.

**29093** **APTIC NO. 50692**

Steubing, L. and R. Klee

**LICHEN EXPLANTS.** *In: Lufthygienisch-meteorologische Modelluntersuchung In der Region Untermain. 4. Arbeitsbericht. Regionale Planungsgemeinschaft Untermain, Frankfurt am Main (West Germany), p. 81, Oct. 1972.*

Apart from mapping of the natural growth of lichens, bark pieces with lichens were exposed at different locations for a period of 1 yr. No major lichen injuries were observed during the summer months. The lowest ground level concentration was observed in the Frankfurt forest (10% damage). The highest values were reached in the city area of Hanau (up to 60%). The vicinity of highways and busy streets caused damages between 16 and somewhat more than 20%.

**29094** **APTIC NO. 50973**

Umemoto, K. and K. Hozumi

**CORRELATION BETWEEN THE DEGREE OF AIR POLLUTION AND THE DISTRIBUTION OF CALCIUM OXALATE CRYSTALS IN THE GINGKO LEAF.** *Microchem. J., 17(6):689-702, Dec. 1972. 15 refs.*

Distribution patterns of calcium oxalate crystals in gingko leaves are compared in terms of the degree of air pollution at various tree locations. Leaf specimens were ashed on microscope slides in a low-temperature plasma incinerator energized with a high- frequency current. The calcium oxalate previously present in the leaf survived in the ash in a state of perfect preservation and in the same spacial arrangement that characterized their original positioning in the tissue matrix. Leaves grown in a clean atmosphere yield small isolated crystals sparsely scattered throughout the mesophyll, while leaves from high pollution areas were characterized by clusters of larger and more irregular crystals lying along prominent veins. (Author summary)

**29095** **APTIC NO. 50503**

Yatazawa, M., M. Kadota, and S. Ono

**FLUORINE CONCENTRATION IN ENVIRONMENTAL SAMPLES MEASURED BY IRRADIATION SYSTEM.** *(Kokaku hanno-ho ni yoru kankyo shiryo-chu no fusso-ryo). Text in Japanese. Kankyo Hoken Reporto (Environ. Health Rept.), no. 8:29-30, 1972.*

Fluorine in plants and soil can be measured up to 0.005 ppm by an irradiation method with a + or 8% precision rate. Fluorine is trapped with sodium hydroxide-sodium oxide, and an anion exchange method is used for pretreatment. Then a F(19)/F(18) reaction is used and the radioactivity of F(18) is measured by a gamma spectrometer.

**29096** **APTIC NO. 50505**

Yatazawa, M. and S. Ono

**QUANTITATIVE MEASUREMENT OF FLUORINE BY IRRADIATION SYSTEM.** *(Kokaku hanno ni yoru fusso no teiryo-ho). Text in Japanese. Kankyo Hoken Reporto (Environ. Health Rept.), no. 8:7-8, Jan. 1972.*

An irradiation analysis of fluorine in plants and soils is described. The detection limits were 0.41 micrograms carbon(11), 0.17 micrograms nickel(13), 0.17 micrograms oxygen(15), 43 micrograms sodium(22), 0.069 micrograms chlorine(34), and 0.003 micrograms fluorine(18). The detection limit of chlorine is low compared to fluorine. Since chlorine can interfere with fluorine, isolation by gamma irradiation is required. This method can be used to determine small quantities of fluorine.

## 1968

**29097** **APTIC NO. 50581**

Bernatzky, A.

**PROTECTION PLANTINGS FOR AIR PURIFICATION AND IMPROVEMENT OF ENVIRONMENTAL CONDITIONS.** *(Schutzpflanzungen zur Luftreinigung und Besserung der Umweltbedingungen). Baum-Ztg., 2(3):37-42, 1968. 35 refs. (Presented at the Council of Europe Symposium on Air Pollution, Wageningen, West Germany, April 1968.) Translated from German, 27p.*

The role of planned forestry and planting in air pollution and general environmental control is examined. Positive results were ascertained in the effects of protective planting on reducing the amount of particulate and solid and gaseous radioactive substances in the air, assimilation of carbon dioxide, noise reduction, and overall improvement of local climatic conditions and the entire living environment.

### 1956

**29098** **APTIC NO. 50609**

Koehler, H.

PATHOLOGICAL ANATOMOCAL CHANGES IN ANIMALS CAUSED BY MODERN RODENTICIDES, WOOD IMPREGNATION AGENTS, PLANT PROTECTIVE AGENTS, INSECTICIDES, AND SEVERAL OTHER MODERN PRODUCTS OF THE CHEMICAL INDUSTRY. *(Pathologisch-anatomische Veraenderungen bei Tieren durch moderne Rodentizide, Holzimpraegnierungsmittel, Pflanzenschutzmittel, Insektizide und einige moderne Produkte der chemischen Industrie). Monatsh. Veterinaermed., 11(2): 669-675, 1956. 47 refs. Translated from German, 22p.*

The effects on animals of rodenticides (metallophosphides, thiourea derivatives, thallium, dicumarol, and derivatives), wood impregnation agents (chloronaphthaline), insecticides (DDT and hexachlorocyclohexane), plant protective agents (E605, dinitrocresol, sodium chlorate, and zinc carbamide), and various chemical agents, including igelite and tar-containing glues, and the pathological anatomical changes produced by these chemicals are reviewed. The intake mechanism, application form, animals affected, lethal dosage, and intoxication symptoms are examined.

## EFFECTS-MATERIALS

### 1973

**29099** **APTIC NO. 50846**

Campbell, Gordon G., Garmond G. Schurr, Donald E. Slawikowski, and John W. Spence

ASSESSING AIR POLLUTION DAMAGE TO COATINGS. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C. Chemistry and Physics Lab. and Sherwin-Williams Research Center, Chicago, Ill., 34p., 1973 (?). 15 refs.*

A Xenon Arc Weather Ometer with controlled pollutant concentrations, humidity conditions, temperature, and ultraviolet light intensity was used to demonstrate that common atmospheric pollutants, specifically sulfur dioxide and ozone, have an effect on the durability of organic coatings. Pollutant effects were observed by gravimetric erosion rate measurements supported by attenuated total reflectance (ATR) infrared examinations and scanning electron microscopy. Those coatings that contained extender pigments, particularly calcium carbonate, showed the greatest effect from SO2 as a pollutant. Coatings exposed to ultraviolet light radiation showed the greatest effect from O3 as a pollutant. Attempts to demonstrate similar effects during actual field exposures at sites with different levels of pollutants were only partially successful. The presence of other variables in weather conditions that affect erosion rates and extent of coating degradation tended to obscure the effect of atmospheric pollutant concentrations on such coating failures. (Author summary modified)

**29100** **APTIC NO. 50960**

Schwabe, K.

EFFICIENT MATERIAL CYCLE AS IMPORTANT TASK OF THE CONSCIENTIOUS PLANNING OF THE MAN-ENVIRONMENT RELATIONSHIP IN THE DDR. *(Effektiver Stoffkreislauf als wichtige Aufgabe bei der bewussen Gestaltung der Mensch-Umwelt-Beziehung in der DDR). Text in German. Technik (Berlin), 28(5):322-325, 1973. (Presented at the Verpackungstagung, Leipzig, East Germany, Nov. 7, 1972.)*

The demand for metallic and non-metallic inorganic and organic material will steeply increase until the year 2000 for two reasons: the world population will double and the standard of living will go up. The demand for metallic material will have to be covered to a large extent by reusing used metals. A good deal of material could be saved by reducing the losses from corrosion. Today about 30 to 35% of produced iron is lost irrevokably by corrosion. The annual corrosion losses the world over are estimated to reach over 18 billion dollars. The increasing corrosion losses, despite the greatly improved protective measures are due to the pollution of the atmosphere, primarily to the rising sulfur dioxide concentration. The corrosion speed in industrial centers is at least twice as high as in rural areas. Annually 70 million tons of sulfur are emitted into the atmosphere in the form of SO2 all over the world. If the atmospheric corrosion could be reduced to 1/2 the present extent by reduction of the SO2 emission, an investment of 33 billion dollars for measures to remove the SO2 would pay off within 4 years by saving material from corrosion.

**29101** **APTIC NO. 50644**

Wang, Tailer J. Y.

POLYMER-GAS REACTIONS: THE MORPHOLOGY OF NYLON 66. REACTION OF NITROGEN DIOXIDE WITH GELATIN, KERATIN AND POLYURETHANE IN ABSENCE AND PRESENCE OF ULTRAVIOLET LIGHT AND OXYGEN. *Clarkson College of Tech., Potsdam, N. Y., Dept. of Chemistry, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1973, 218p. 64 refs.*

A heating device was designed and constructed for preparation of Nylon 66 samples with different morphologies. The samples were characterized with a polarizing microscope, density measurements, intrinsic viscosities, and infrared spectra. Two samples were examined by microphotography and density measurements repeatedly. Results showed that different morphologies could be obtained and reproducible morphologies achieved by the above techniques. Nitrogen dioxide, gelatin, and keratin were chosen for studying the effects of air pollutants on proteins. Films were exposed to various conditions. Results showed these proteins were fairly stable toward NO2. The effects of NO2 on polyurethane were also observed. Results indicate that polyurethane suffers chain scission and crosslinking simultaneously. (Author abstract modified)

## EFFECTS-ECONOMIC

### 1973

**29102** **APTIC NO. 50873**

Busch, J. S.

DESIGN AND COST OF HIGH ENERGY SCRUBBERS-PART 2. *Pollut. Eng., 5(2):32-35, Feb. 1973.*

A procedure for estimating the cost of auxiliary equipment such as a fan, fan motor, motor starter and fan-to-motor coupling is presented. By using the fact that the gases exiting the scrubber have only a restricted range of parameters, and by matching fan and fan motor data to these parameters, the pollution engineer can use simplified correlations for determining the cost of this equipment. Sample calculations for the cost of the scrubber system are presented. The total cost of $83,050 for the scrubber system is estimated.

**29103** **APTIC NO. 50665**

Calvin, E. L.

A PROCESS COST ESTIMATE FOR LIMESTONE SLURRY SCRUBBING OF FLUE GAS. (FINAL REPORT). PART II - DETAILED ESTIMATE SHEETS. *Catalytic, Inc., Charlotte, N. C., Environmental Protection Agency*

*Contract 68-02-0241, Program Element 1A2013, EPA-R2 73-148b, Task 11, 96p., Jan. 1973.*

NTIS: PB 219017

Detailed estimate sheets are presented, resulting from a conceptual design and cost estimate for a wet limestone scrubbing system for removal of sulfur dioxide from the flue gas of a new 500-megawatt steam boiler plant, fired with coal containing 3.5% sulfur by weight. The estimate covered all equipment from the boiler breeching to the stack, including limestone storage and processing, slurry scrubbing with stack gas reheater and accessories, and spent limestone slurry pond disposal and water recovery. The capital cost for the installed scrubbing system was estimated at $20.15 million, or an incremental cost of $40.30/kw of installed power. The operating cost was estimated to be $7.20 million/yr, or 2.06 mills/kwh of electricity generated.

**29104** **APTIC NO. 50728**

Mertschnig, Max

TECHNICAL ECONOMICAL ASPECTS OF THE USE OF GAS IN TOTAL ENERGY PLANTS DISCUSSED ON HAND OF EXAMPLES FROM THE NON-INDUSTRIAL SECTOR. *(Technisch-wirtschaftliche Aspekte der Verwendung von Gas in Total-Energie-Anlagen, dargestellt an Beispielen aus dem nicht-industriellen Bereich). Text in German. Gas-Wasserfach, Gas Erdgas (Munich), 114(4):174-183, 1973. (Presented at the Gasfachlichen Aussprachetagung, Koblenz, West Germany, 1972.)*

Total energy plants serve for the complete supply of power for buildings and industrial complexes. They provide mechanical and/or electric power and use the waste heat for heating and refrigeration by means of absorption systems or for production processes. In the U. S. total energy plants are spreading rapidly. They are advantageous for densely populated and industrialized areas because of the absence of thermal pollution and pollutant emissions. The use of four total energy plants in the non-industrial sector (shopping center, hospital, office building, and residential area with a population of 20,000) is discussed and the costs compared with conventional power supply methods.

**29105** **APTIC NO. 50523**

Morisugi, Hisayoshi, Ikujiro Wakai, and Kochiro Hayashi

A CONSIDERATION OF SOCIAL EXPENDITURE DUE TO AIR POLLUTION IN AN AREA. *(Chiiki ni okeru taiki osen ni yoru shakaiteki hiyo ni kansuru ichi-kosatsu). Text in Japanese. Preprint, Japan Society of Civil Engineers, Tokyo, p. 31-35, 1973. 5 refs. (Presented at the Symposium on the Civil Engineering Planning, 7th, Tokyo, Japan, Jan. 24-25, 1973, Paper I-6.)*

The social costs and benefits of air pollution are discussed. If progress and security could be evaluated and given a monetary value, it would be easier to compare social expenditure due to pollution to these factors. The social expenditure relative to air pollution was calculated as data for making an economic assessment of the social sacrifice due to air pollution damage. In the case of automobile pollution, a model equation in which no influence in areas other than damaged areas showed better results. If the relationship of air pollution to automobile exhaust is made clear, a clear explanation can be made for the results. The results suggest that the influence of automobile exhaust gas may be local.

**29106** **APTIC NO. 50921**

Rush, Dumont, John C. Russell, and Reid E. Iverson

AIR POLLUTION ABATEMENT ON PRIMARY ALUMINUM POTLINES: EFFECTIVENESS AND COST. *J. Air Pollution Control Assoc., 23(2):98-104, Feb. 1973.*

Representative capital and operating costs and removal efficiencies for a number of kinds of applicable control equipment have been developed and organized in a way which approximates evaluations among alternative approaches to pollution abatement. A brief analysis shows that the application of the best demonstrated pollution abatement technology to the collected primary effluents from aluminum potlines would result in representative total fluoride emissions of from 1.2 to 4.7 lbs/1000 lbs of aluminum produced depending on the type of potline. The addition of scrubbing equipment on the secondary or building ventilation streams would reduce total fluoride emissions to the range 0.8 to 2.0 lbs/1000 lbs aluminum at considerably increased costs. The summary of system analysis applied to the entire U. S. aluminum production industry showing the expected costs and performance parameters associated with upgrading the industry overall control from the present 74% to 92% of control is included. It would increase invested industry capital for pollution control from $51 to $175/capacity ton and would raise the industry operating cost of pollution abatement from $13 to $43/ton of aluminum produced at capacity.

## 1972

**29107** **APTIC NO. 50798**

Meyer, B.

FUTURE USES OF SULFUR. *Int. J. Sulfur Chem., Part B, 7(1):37-39, 1972. 2 refs.*

The effect of sulfur dioxide abatement on the supply of sulfur and uses for sulfur are reviewed. Elemental sulfur, recovered as a result of SO2 control processes, can be applied to the manufacturing of fertilizer, for use in the production of chemical products and insecticides, in pulp and paper manufacturing, for iron pickling and pigment production, and in the manufacturing of man-made fibers. All these uses, however, would not exhaust the projected sulfur supply. New applications and uses must, therefore, be examined and developed.

**29108** **APTIC NO. 50837**

Trijonis, John Charles, Jr.

AN ECONOMIC AIR POLLUTION CONTROL MODEL-APPLICATION: PHOTOCHEMICAL SMOG IN LOS ANGELES COUNTY IN 1975. *California Inst. of Tech., Pasadena, Dept. of Engineering, Thesis (Ph.D.). Ann Arbor, Mich., Univ. Microfilms, Inc., 1972. 390p. 152 refs.*

An economic air pollution control model, which determines the least cost of reaching various air quality levels, was formulated. The model takes the form of a general, nonlinear, mathematical programming problem. Primary contaminant emission levels are the independent variables. The objective function is the cost of attaining various emission levels and is to be minimized subject to constraints that given air quality levels be attained. The model was applied to a simplified statement of the photochemical smog problem in Los Angeles County in 1975 with emissions specified by a two-dimensional vector, total reactive hydrocarbon (RHC), and nitrogen oxide (NOx) emissions. Air quality, also two-dimensional, was measured by the expected number of days per year that nitrogen dioxide and mid-day ozone exceed standards in Central Los Angeles. The minimum cost of reaching various emission levels was found by a linear programming model. Controls were considered for used cars, aircraft, and existing stationary sources. With the added controls, Los Angeles County emission levels could be reduced to 260 tons/day RHC and 460 tons/day NOx. The control cost-emission level and air quality-emission level relationships were combined in a graphical solution of the complete model to find the cost of various air quality levels. Best possible air quality levels with the controls considered are 8 O3 and 10 NO2 violations/yr or 25 O3 and 3 NO2 violations/yr with an annual cost of $230,000,000 (above the estimated $150,000,000/yr for the new car control program for Los Angeles County motor vehicles in 1975). (Author abstract modified)

# STANDARDS AND CRITERIA

## 1973

**29109** **APTIC NO. 50980**

Ruckelshaus, William D.

MAINTENANCE OF NATIONAL AMBIENT AIR QUALITY STANDARDS. *Federal Register, 38(45):6279-6280, March 8, 1973.*

The Environmental Protection Agency (EPA) has promulgated national primary and secondary ambient air quality standards for six pollutants. The act requires that the primary standards protect the public health with an adequate margin of safety and that the secondary standards protect the public welfare from any known or anticipated adverse affects. The EPA is preparing draft regulations which will identify the types of facilities to be covered by complex source regulations and some of the factors to be considered in determining the impact that such facilities will have on air quality, as a result of emissions directly from such facilities and air pollution sources associated with them. These sources include shopping centers, sport complexes, drive-in theaters, parking lots, garages, residential, commercial, industrial and institutional developments, amusement parks, highways, and sewer, water, power and gas lines.

## 1971

**29110** **APTIC NO. 50783**

Shabad, L. M.

CONCERNING THE POSSIBILITY OF ESTABLISHING MAXIMUM PERMISSIBLE DOSES AND CONCENTRATIONS (MPDS AND MPCS) FOR CARCINOGENS. *(O vozmozhosti ustanovleniya predel no dopustimykh doz i k kontsentratsii (PDD i PDK) kantserogennykh veshchestv). Hyg. Sanit. (English translation from Russian of: Gigiena i Sanit.), 36(10):115-120, 1971. 28 refs.*

The possibility of establishing maximum permissible doses and concentrations for carcinogens is discussed. Arguments are presented for the need of such standards, and the attempts made to date to achieve them are reviewed. Studies of carcinogenic hydrocarbons in the human environment are cited. These showed the circulation of such substances entering the atmosphere from a variety of sources and then deposited in soil, water and vegetation, followed by their redistribution in the soil and the possibility of their entry into plants, animal fodder, and human food. Experimental and occupational pathologic research should be extended to create a foundation for standards for carcinogenic substances, and such standards should be set for each carcinogen individually.

# LEGAL AND ADMINISTRATIVE

## 1973

**29111** **APTIC NO. 50660**

TRW Transportation and Environmental Operations, Redondo Beach, Calif.

A TRANSPORTATION CONTROL STRATEGY FOR THE PHOENIX-TUCSON AIR QUALITY AREA. (FINAL REPORT). *Office of Air and Water Programs Contract 68-02-0048, Proj. DU-72-B895, TASK 11, Pub-APTD 1369, 240p., Feb. 1973. 40 refs.*

NTIS: PB 218823

The formulation of a transportation control strategy for meeting the promulgated air quality standards in the Phoenix-Tucson area is discussed. The report is concerned with: The identification of the most promising transportation control measures to achieve air quality standards; the prediction of emission reductions and air quality impact anticipated from each of the control measures and strategies considered; the assessment and documentation of those political, institutional, legal, and socio-economic obstacles that can be expected in the implementation process; and the formulation of a timetable of key checkpoints to be used by the Environmental Protection Agency in monitoring implementation progress. Monthly air quality concentration measurements for hydrocarbons, carbon monoxide, nitrogen dioxide and photochemical oxidants for year 1969 and 1971 are reported. The report demonstrates the nature of the air quality problem attributed to motor vehicle operation, the magnitude of the problem and a strategy developed to neutralize these effects in order that national ambient air quality standard may be attained and maintained. Control strategies include retrofit program, traffic improvements, gasoline evaporative controls, and improved mass transit.

**29112** **APTIC NO. 50954**

Kanagawa Prefectural Government (Japan), Pollution Control Bureau

THE PRESENT CONDITION OF PHOTOCHEMICAL POLLUTION AND COUNTERMEASURES. *(Kokagaku kogai no genjo to taisaku). Text in Japanese. 80p., March 1973.*

The state and scope of photochemical incidents in Kanagawa Prefecture, emergency measures, warning systems, the photochemical pollution monitoring network, mobile monitoring units, prevention measures, and investigation and research projects conducted by the Prefecture are discussed. As preventive measures, the formation of project teams, the method of forecasting, the alarm communication method and emergency treatment, preventive measures at schools, automotive emission control measures, and hydrocarbon control measures are discussed. Investigation and research projects involve all the major educational institutions, industrial and hygienic research institutions, agricultural and forestry research labs, and city prefectural government agencies. The projects include studies on toxic pollutants, formation mechanisms, mobility, dispersion, and continuous distribution of pollutants, meteorological factors, and the effects on the human body and on plants. Studies on the effects on the human body include animal experiments with automotive emissions and ultraviolet ray mixture exposures, effects on the eye and the respiratory system, acute and chronic effects, epidemiological studies by questionnaires, clinical studies of respiratory functions, ear-nose-throat and eyes, and emergency treatment of victims. Molecular structure studies of ketones, aldehydes, and nitrogen compounds and their relationships with the human body and plants are also in progress.

**29113** **APTIC NO. 51012**

Chedd, Graham

LOS ANGELES HEADS FOR THE CRUNCH. *New Scientist, 57(832):290-292, Feb. 8, 1973.*

Environmental Protection Agency (EPA) has announced that by 1977 automobile traffic in the Los Angeles area would have to be curbed during the summer months by as much as 82%. The six million cars of the Los Angeles basin pour out their fumes into the air mass which in summer is frequently trapped by an atmospheric temperature inversion as effectively as the steam is trapped in a lidded saucepan. Unburned hydrocarbons and the nitrogen oxides in the exhaust gases react to form the irritant, eyestinging photochemical oxidants. Photochemical oxidants are restricted by EPA standards to 0.08 ppm average for a one-hour period, a level not to be exceeded more than once a year. In 1970, the level was exceeded in Los Angeles on at least 250 days. On one occasion the level briefly reached 5.1 ppm. Various alternatives such as use of low-polluting fuels like natural gas, more stringent emission restrictions on stationary sources, and a decent Mass Transit system are suggested. Senate bills introduced by Senator Edmund Muskie are discussed. One such bill would provide $1 billion a year for two years to aid Mass Transit projects. Another would give direct assistance to the 28 specially polluted area.

**29114** **APTIC NO. 50971**

Farley, Philip J.

ISSUANCE OF AGENCY PROCEDURES FOR COMPLIANCE WITH FEDERAL ENVIRONMENTAL STATUTES. *Federal Register, 38(45):6321-6323, March 8, 1973.*

The publication of proposed procedures of the U. S. Arms Control and Disarmment Agency for compliance with federal environmental statutes is described. The requirements of these procedures are in addition to, and not a substitute for, any environmental analyses or consultations required by any international obligations of the U. S. The need for environmental impact statements is specified. The Bureau of Science and Technology has primary responsibility over a proposed major action which may significantly affect the environment. Each Agency office shall inform the bureau of any proposed actions, the potential environmental impacts, and reasonable alternatives.

**29115** **APTIC NO. 50983**

Fri, Robert W.

APPROVAL OF PLAN REVISIONS. *Federal Register, 38(55):7458-7459, March 22, 1973.*

The implementation plan submitted by the State of Pennsylvania for attainment and maintenance of national ambient air quality standards in accordance with the Clean Air Act is presented. Certain portions of this plan were approved by the Environmental Protection Agency. Pennsylvania was granted an 18-month extension for submission of a plan to attain secondary standards for particulates and sulfur oxides in the southwest intrastate region including Allegheny county, and the metropolitan Philadelphia interstate region. The proposed revisions to the implementation plan related to the coke-making operations at the U. S. Steel Corp. and U. S. Steel Clairton Works in Allegheny County are described. The plan included a revision to the control strategy for particulates, a revision to the control strategy for sulfur dioxides, and compliance schedules relating to coke ovens, coke-oven combustion, industrial boilers, and coke quenching.

**29116** **APTIC NO. 50776**

Kaji, Hideki

COMPREHENSIVE EXAMINATION OF POLLUTION PROTECTION POLICIES. *(Kogai boshi seisaku no sogoteki kento). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 4:303-307, March 1973. 6 refs.*

City pollution control policies are discussed including factory location regulations, traffic regulations, and redevelopment. Regulations in one area may increase pollution in another area or cause another type of pollution. Thus, all effects produced by a control policy must be traced. Because of the various impacts of control policies, action is difficult to take. Environmental standards can be used to evaluate policies.

**29117** **APTIC NO. 50913**

Kobayashi, Ikuo

PRESENT CONDITIONS AND THE FUTURE OF CAR EXHAUST GAS REGULATIONS. *(Jidosha haishutsu gasu kisei no genjo to shorai). Text in Japanese. Nippon Kikai Gakkai-shi (Journal of the Japanese Society of Mechanical Engineers) (Tokyo), 76(653):571-577, May 1973.*

In 1973, the carbon monoxide regulation for automotive exhaust was strengthened. Hydrocarbon and nitrogen oxide emission standards remained the same. The concentration control system was replaced with a weight control system in which contaminants are represented with g/km or g/B/mi instead of % or ppm. Emission standards are 2.1 g/km for CO, 0.25 g/km for HC, and 1.2 g/km for NOx for 1975; for 1976 the value for NOx is 0.25. There seems little chance of Japan enforcing regulations as strict as Muskie's law. However, the discovery of a good catalyst could change that.

**29118** **APTIC NO. 50869**

Koda, Tadatsuna

AIR POLLUTION CONTROL LEGISLATION. *(Taiki osen kankei horei). Text in Japanese. PPM (Japan), 4(4):21-29, April 1973.*

Air pollution control legislation in Japan is summarized including environmental standards, the definition of pollution, responsibility for pollution control, and governmental programs for pollution control. Sulfur oxide and suspended particulate standards are mentioned. The principle of having the polluter pay for pollution he causes is described. Legislative goals and registration of sources are mentioned. The stack effluent regulation standard is described for sulfur oxides, stack plumes, harmful effluents, registration, inspection, and approval. Regulations for automobile exhaust gas are also discussed. The role of pollution control personnel in the pollution control system is described.

**29119** **APTIC NO. 50770**

Kuramoto, Yoshihisa and Keiichi Iizaka

CITY PROBLEMS AND LAND PROBLEMS. *(Toshi mondai to tochi mondai). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 4:285-291, March 1973. 12 refs.*

Problems occurring in the city are related to land use problems and pollution. Land use by industries, economic factors, profit margins, and financing of industrial land purchases are mentioned.

**29120** **APTIC NO. 50777**

Nanbu, Tsuruhiko and Isao Aoki

GENERAL BALANCE INCLUDING ENVIRONMENT AND REMOVAL OF POLLUTION. *(Kankyo o fukumu ippan kinko to osen no jokyo). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Rese. Inst. Environ. Prot.), vol. 4:308-312, March 1973.*

The effect of a control policy is analyzed theoretically by a general balance model which includes goods and services in the market and the life environment. An economic area which is independent is considered where consumption and production are carried out by industries and laborers. Freedom of transfer of the laborers is assumed. Quality control of water with respect to the turbidity of a river is considered. A socially desirable water quality standard may become stricter as the society becomes richer, since people would require a cleaner river. When the source of pollution is traced, authorities will charge the industry causing the water pollution with the expense for cleaning the river. However, the environmental problem is not solved by merely determining the industry's responsibility, since income distribution and social aspects must be considered. The residents themselves must make a decision to improve the environment.

**29121** **APTIC NO. 50816**

Rockefeller, M. W.

AN ANALYSIS OF THE REGULATORY ASPECTS OF NATURAL GAS SUPPLY. (FINAL REPORT). *Foster Associates, Inc., Washington, D. C. Office of Air and*

Water Programs Contract 68-02-0640, Pub-APTD-1458, 54p., March 1973.

NTIS: PB 219467

A study was conducted to review the current regulatory picture affecting the supply and distribution of natural gas, to analyze possible changes in this regulatory picture, and to appraise alternate regulatory strategies which could bring about increased supplies of these clean-burning fuels. Natural gas from wellhead production within the contiguous lower 48 states and non-conventional sources of supply are treated in this analysis. The latter include gas from Alaska, gas imports from Canada, from overseas nations, and synthetic gas reformed from liquid hydrocarbons or coal. State regulations, leasing of Federal Lands, Federal Power Commission regulations, Office of Coal Research and Price Commission regulations, and regulations from the Departments of State, Defense, and Commerce are reviewed.

**29122** **APTIC NO. 50817**

Rockefeller, M. W. and R. L. Schantz

AN ANALYSIS OF THE REGULATORY ASPECTS OF NATURAL GAS SUPPLY. (FINAL REPORT). *Foster Associates, Inc., Washington, D. C., Office of Air and Water Programs Contract 68-02-0640, Pub-APTD-1459, 286p., March 1973. 181 refs.*

NTIS: PB 219667

Ways to increase the supply of pipeline quality natural gas for stationary utilization, by reference to government regulations, are discussed. A comprehensive picture of the current situation as it relates to the regulation of supply and distribution of gas in the U. S. is developed. This includes identification of regulatory authorities and their function, a definition of existing procedures available for bringing about changes in the supply and distribution of gas, and suggestions as to how EPA may participate to bring about these changes. Future changes foreseen in the regulation of gas are identified. Possible strategies for bringing about future changes are suggested, and estimates are made respecting cost effectiveness and time requirements for optimal strategies. Strategies for increasing gas supply include sanctity of contract legislation, decontrol legislation, legislation to expand Federal regulation, modification of producer regulations, acceleration of offshore leasing, and encouragement of supplemental gas supplies such as those from gasification of coal or oil. State and Federal control agencies whose regulations affect the supply of gas are reviewed. Regulation of natural gas by the Federal Power Commission is also discussed. Supply and demand factors affecting gas supply are mentioned.

**29123** **APTIC NO. 50979**

Ruckelshaus, William D.

SUBMISSION OF TRANSPORTATION AND/OR LAND USE CONTROLS. *Federal Register, 38(53):7323-7330, March 20, 1973.*

Control strategy were required by the states for the three pollutants present in the ambient air. The Clean Air Act requires that the primary standards protect the public health with an adequate margin of safety, and that the secondary standards protect the public welfare from any known or anticipated adverse effect. The pollutants include carbon monoxide, hydrocarbons, and photochemical oxidants which are largely attributable to motor vehicles. Many states were unable to submit adequate control strategies utilizing only limitations in emissions from stationary sources. Many states requested 2-year extensions for the attainment of the primary standards for these pollutants based on the unavailability of transportation control measures.

**29124** **APTIC NO. 50981**

Ruckelshaus, William D.

PREPARATION, ADOPTION, AND SUBMITTAL OF IMPLEMENTATION PLANS, ADVANCE NOTICE OR PROPOSED RULE MAKING. *Federal Register, 38(45):6290-6291, March 8, 1973.*

Regulations for the preparation, adoption, and submittal of state implementation plans require maintenance and attainment of the national standards established by the Environmental Protection Agency EPA. The advance notice of proposed rule making is published with the intention of informing the public on the actions and plans of the EPA in this important area, and for the purpose of providing states notice of an impending change in the implementation plan regulations which will require the adoption and submission to the EPA of additional provisions. States should begin now to determine whether they have adequate legal authority to adopt such a regulation and if they do not, take steps to secure such legal authority.

**29125** **APTIC NO. 50982**

Ruckelshaus, William D.

MOTOR VEHICLE POLLUTION CONTROL SUSPENSION REQUEST. *Federal Register, 38(38):5281, Feb. 27, 1973.*

Notice and procedures for a public hearing on the decision by the Environmental Protection Agency to deny applications by General Motor Corp., Ford Motor Co., Chrysler Corp., and International Harvester Co., for suspension of the effective date of the 1975 motor vehicle emission standards are described. The Clean Air Act provides that any time after Jan. 1, 1972, any automobile manufacturer may file an application requesting the suspension for 1 year only of the effective date, with respect to that manufacturer, of the carbon monoxide or hydrocarbons or both, emission standards applicable to light duty vehicles manufactured during beginning with the model year 1975. If such request be granted, interim emission standards will be imposed which shall apply to emissions of carbon dioxide or hydrocarbons or both, for such vehicles manufactured during model year 1975. Such interim standards shall reflect the greatest degree of emission control which is available, giving appropriate consideration to the cost of applying such technology within the period of time available to manufacturers.

**29126** **APTIC NO. 50775**

Sasaki, Shunsuke and Koji Kurihara

STUDY OF THE POSSIBILITY OF PLANT TRANSFER (1). *(Kojo iten no kanosei ni kansuru kento (1). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 4:298-302, March 1973. 10 refs.*

Transfer of industries in large cities, pollution policy, and other land use policies are discussed. Pollution regulations and taxation affect small industries to a great extent and effect large industries very little. The effects of pollution control policies on various industries are discussed. Control measures should take into account the size of an industry.

## 1972

**29127** **APTIC NO. 50629**

GCA Corp., Bedford, Mass., Technology Div. and TRW Systems Group, McLean, Va., Transportation and Environmental Operations

TRANSPORTATION CONTROLS TO REDUCE MOTOR VEHICLE EMISSIONS IN MAJOR METROPOLITAN AREAS. *Office of Air and Water Programs Contract 68-02-0041 and Contract 68-02-0048, Pub-APTD-1462, Proj. DU-72-B895, 137p., Dec. 1972. 7 refs.*

NTIS: PB 218938

Transportation control strategies to reduce motor vehicle emissions in fourteen major metropolitan areas were studied. Implementation plans were reviewed to verify and assess the severity of the carbon monoxide and oxidant pollutant problem. Control strategies were identified and their impact on emissions, as well as the feasibility of achieving control was considered. The likely impact anticipated from each of the control techniques was estimated using established rollback or modeling methods; obstacles to the implementation programs were documented; and surveillance programs to monitor implementation progress were developed. The fourteen areas studied included Dayton, Denver, Houston/Galveston, Los Angeles, New York City, Philadelphia, Phoenix/Tucson, Baltimore, Boston, Pittsburgh, Salt Lake City, Spokane, Seattle, Minneapolis/St. Paul. The air quality problems encountered in each of these areas are discussed, and the recommended strategies for each city are given. Strategies include inspection, maintenance, gaseous fuel use, engine operation modifications, traffic flow improvements, and mass transit.

**29128** **APTIC NO. 50632**

GCA Corp., Bedford, Mass., Technology Div.

TRANSPORTATION CONTROLS TO REDUCE MOTOR VEHICLE EMISSIONS IN SPOKANE, WASHINGTON. *Office of Air and Water Programs Contract 68-02-0041, Pub-APTD-1448, 123p., Dec. 1972. 4 refs.*

NTIS: PB 219000

Transportation control strategies to reduce motor vehicle emissions in Spokane, Washington were studied. Pollutant concentration levels for carbon monoxide and oxidant pollutants were predicted for 1977 together with non-vehicular emissions on the basis of extant air quality data, stationary source emissions, and traffic patterns. Comparison of the predicted 1977 pollutant concentrations with the national air quality standards enabled the computation of motor vehicle emissions and to what extent reductions would be required. Candidate control strategies were developed, evaluated, and ranked in regard to technical, legal, institutional, sociological, and economic criteria. Control strategies studied included implementing a computer controlled traffic signal system with related street widenings, and spot parking prohibitions; implementing a transit improvement program; developing State sponsored incentive programs for retrofit (and inspection) of heavy-duty fleet vehicles; gaseous conversion for fleet vehicles; implementing a second-level sidewalk system; taking advantage of any residual fringe parking and driver advisory system for Expo-74; encouraging car pools and staggered days programs; improvement of curb loading in downtown; and supporting incentive programs to discourage ownership of older, uncontrolled vehicles. The obstacles to implementing the selected strategies were reviewed. Surveillance programs to monitor the implementation of the control strategies are discussed.

**29129** **APTIC NO. 50633**

Inst. of Public Administration, Washington, D. C.; Teknekron, Inc., Washington, D. C.; and TRW, Inc., McLean, Va.

EVALUATING TRANSPORTATION CONTROLS TO REDUCE MOTOR VEHICLE EMISSIONS IN MAJOR METROPOLITAN AREAS. *Environmental Protection Agency Contract 68-02-0048, Task 6, APTD-1364, 362p., Nov. 1972. 151 refs.*

NTIS: PB 219655

Various transportation controls to reduce motor vehicle emissions in major metropolitan areas were evaluated with respect to their effectiveness in reducing emissions, their feasibility, and the probable costs. The major metropolitan areas considered included Chicago, Denver, Los Angeles, New York City, San Francisco, and Washington, D. C. The transportation controls studied included inspection, maintenance, and retrofit; gaseous fuel systems; traffic flow techniques; bypassing thru traffic; improvements in public transportation; motor vehicle restraints; work schedule changes; and land use controls. The short-term impact (2-5 years) on travel patterns and emissions of carbon monoxide was determined.

**29130** **APTIC NO. 50664**

GCA Corp., Bedford, Mass., Technology Div.

TRANSPORTATION CONTROLS TO REDUCE MOTOR VEHICLE EMISSIONS IN SEATTLE, WASHINGTON. (FINAL REPORT). *Office of Air and Water Programs Contract 68-02-0041. Proj. DU-72-B895, Pub-APTD-1444, 179p., Dec. 1972.*

NTIS: PB 218824

The purpose of this study was to identify and develop transportation control strategies that will achieve the carbon monoxide and oxidant air quality standards required by the State of Washington in the Seattle urban area by the year 1977. Calculations of motor vehicle emissions were carried out for central areas of Tacoma and Everett. The hydrocarbon emissions from motor vehicles will decrease by 51% between 1971 and 1977. METRO transit development, fringe parking with personalized rapid transit, retrofit programs, gaseous fuel use, and an improved downtown signal system are recommended for the implementation plan. The oxidant problem in the Seattle area is less severe than initially thought and will not require the imposition of transportation control strategies.

**29131** **APTIC NO. 50773**

Tokyo Metropolitan Environmental Protection Inst. (Japan)

OUTLINE OF PLAN TO PROTECT CITIZENS OF TOKYO FROM ENVIRONMENTAL POLLUTION, 1972. *128p., Nov. 1972.*

The plan to protect citizens of Tokyo from pollution is discussed, including: general approach to the plan; outline of countermeasures according to pollution phenomena; protection and restoration of nature; common measures; conditions for attaining targets and future tasks; and results of the 1971 plan. The working expenses to carry out this plan will cost about $10,000. Countermeasures against sulfur dioxide, motor vehicle exhaust gases, photochemical smog, offensive odors, poisonous gases, oxygen-poor air, settling soot, dust, and suspended particulates are presented. Countermeasures against waste disposal, noise, water pollution, soil pollution, and land subsidence are also discussed.

**29132** **APTIC NO. 51001**

Belanger, William E.

AIR-POLLUTION MONITORING. *Am. City, 87(9):87, 89, 167, Sept. 1972.*

Air pollution monitoring stations in Philadelphia area are described. A data-acquisition and control system automatically analyzes 4200 measurements per hr. Automatic air monitoring stations measure sulfur dioxide, particulate matter, carbon monoxide, wind speed and direction, and temperature. A teleprinter will automatically advise when conditions become hazardous. Mathematical, physical, and simulation models are discussed.

**29133** **APTIC NO. 50429**

Gerhold, M.

FACT-FINDING AND BASIC CONCEPT FOR AN EFFICIENT ENVIRONMENTAL PROTECTION. *(Bestandsaufnahme und Basiskonzept fuer effizienten Umweltschutz). Text in German. Mitt. Chem. Forschungsinst. Wirt. Oesterr. Oesterr. Kunstoffinst., 26(5):201-212, Oct. 1972. 50 refs.*

Global and emergency measures for environmental protection are derived on the basis of a state-of-the-art study of environmental pollution in connection with economic trends and natural resource policies. Integrated, environment-conscious industrial planning, and introduction of ecologically acceptable technologies and products will be necessary. The rates of increases of various pollutants are influenced by such factors as the rates of population, industrial, and agricultural growth. The growth rates of certain pollutants whose levels have been regularly measured seem to become exponential after a certain steady state is reached. The maximum acceptable loadability of the biosphere for the different pollutants, and especially for their combinations, is far from being adequately known. Reduction of the traffic density, improvement of the traffic flow, the increased use of vehicles with minimum of exhaust emission, the use of low-sulfur fuel, flue gas desulfurization, and improvement of the efficiencies of waste gas cleaning equipment are among the principal measures to be implemented to abate pollution hazards. Fuel oils with 0.46% of sulfur are expected to account for 40% of the fuel oil needs in 1980. Flue gas desulfurization techniques with efficiencies of 80-85% are presently available. Dust separation techniques currently are able to reduce dust concentrations to 300-400 mg/N cu m, while a lower limit of 150 mg/N cu m in continuous operation is desirable. Wet type dust separators currently available for waste incinerators reach efficiencies up to 90%.

**29134** **APTIC NO. 50685**

Hesler, Alexander von

KEEPING AIR CLEAN AND REGIONAL PLANNING. *In: Lufthygienisch- meteorologische Modelluntersuchung in der Region Untermain. 4. Arbeitsbericht. Regionale Planungsgemeinschaft Untermain, Frankfurt am Main (West Germany), p. 3-8, Oct. 1972.*

On September 19, 1972 the Hessian State Government issued a regional plan for the Lower Main Region outlining the population distribution, development of settlements, main cities, and regional green corridors up to the year 1980. Out of the work for this plan the need arose for gaining exact knowledge on the air hygiene meteorological conditions in the area. City and regional planning must see that the emission sources are eliminated as far as possible or are located at places where no effect on the neighborhood are to be expected. Traffic domestic heating, and industry are the major sources to be considered.

**29135** **APTIC NO. 50614**

Jorisson, H. D.

ENGINE MANUFACTURERS AT THE CROSSROADS. EUROPE IS NOT THE USA. *(Motorenbauer am Scheideweg. Europa ist nicht USA). Umwelt (Duesseldorf), May 1972. Translated from German, 6p.*

Some of the measures instituted or proposed by the German government to control the automotive exhaust pollution problem are reviewed and compared with parallel attempts by the United States authorities. The United States plans include control through rich fuel mixtures and catalytic reactors. The technological capabilities of U. S. manufacturers, however, may have been overestimated. Costs are also a major obstacle. The German government proposes control in suitable stages to alleviate cost obstacles, with emphasis on improved motor design rather than added control equipment.

**29136** **APTIC NO. 50686**

Lamp, W.

THE NET OF METEOROLOGICAL STATIONS. *In: Lufthygienisch- meteorologische Modelluntersuchung in der Region Untermain. 4. Arbeitsbericht. Regionale Planungsgemeinschaft Untermain, Frankfurt am Main (West Germany), p. 11-30, Oct.1972.*

The Gauss-Krueger measurement grid for air pollution monitoring comprises 98 stations measuring meteorological data and 55 stations measuring pollutant concentrations (sulfur dioxide and dust). At certain points lichens were planted. Lists of the stations giving the exact location of the measurement units in data and one map illustrating the location of measuring stations are given.

**29137** **APTIC NO. 51011**

Meyers, Sheldon

ENVIRONMENTAL IMPACT STATEMENTS. *Federal Register, 37(147):1534, July 29, 1972.*

A listing of draft environmental impact statements which the Environmental Protection Agency (EPA) has reviewed and commented upon writing during the period from July 1-15, 1973 is presented. The listing includes the Federal agency responsible for the statement, the title of the statement, the classification of the nature of comments of EPA and the source for copies of thhe comments. Copies of the draft environmental impact statements are available from the Federal department or agency which prepared the draft statement or from the National Technical Information Service.

**29138** **APTIC NO. 50446**

Nishida, Minoru, Motoe Aizaki, Yoshitaka Yoshimura, and Hiroshi Ikeda

AIR POLLUTION CONTROL PLANS, OSAKA CITY. I. AIR POLLUTION CONTROL IN NISHIYODOGAWA-KU. *(Kurin ea puran (Osaka-shi taiki osen boshi keikaku kihon koso) sono ichi. Nishiyodogawa-ku taiki osen kinkyu taisaku ni tsuite). Text in Japanese. Japan Society of Air Pollution, Proc. Symp. Japan Soc. Air Pollut., 13th, 1972, p. 157. (Nov. 7-9, Paper 112.)*

Nishiyodogawa Ward of Osaka city has a very active Clean Air Plan. The sulfur oxide concentration in the area was 0.078 ppm (yearly average) in 1970. After a fuel investigation and the computer calculations of air pollution data, a total of 195 factories which were deemed to be emission sources of air pollutants were requested to give total cooperation in the decrease of sulfur oxides and to submit a planned program. Later, in order to verify these programs, fuel spot-checks and sulfur content analyses were given. As a result, the environmental index of this area dropped to 0.06 ppm in 1971, and less than 0.2 ppm hourly averages and less than 0.1 ppm hourly averages passed the environmental standards.

### 1971

**29139** **APTIC NO. 50781**

Maksimova, V. A.

HYGIENIC EVALUATION OF CITY-PLANNING MEASURES FOR CONTROL OF AIR POLLUTION CAUSED BY EXHAUST GASES FROM MOTOR VEHICLES. *(Gigienicheskaya otsenka planirovochnykh sredstv zashchity vozdukha gorodov ot zagryazneniya vybrosami avtotransporta. Hyg. Sanit. (English translation from Russian of: Gigiena i Sanit.), 36(10):13-16, 1971. 4 refs.*

The extent of pollution by exhaust gases from motor vehicles was studied in relation to the intensity of traffic, meteorological factors, the layout of roads, and adjacent buildings. The level of atmospheric pollution was proved to depend on the intensity of traffic and certain meteorological conditions, such as wind speed and air temperature. The level of air contamination could be decreased by 70-90% by proper city planning programs. (Author abstract)

## SOCIAL ASPECTS

### 1973

**29140** **APTIC NO. 50771**

Hori, Hiromichi and Suguru Ninoo

KNOWLEDGE ON POLLUTION AND ITS RELATION WITH CONSCIOUSNESS. *(Kogai ni kansuru chishiki to ishiki no kanren). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol. 4:292-297, March 1973.*

Knowledge about pollution is important in developing social attitudes about pollution. The relationships of knowledge of pollution with feelings of injury, worry about pollution, outlooks, intentions to act, and actual actions are discussed. Highly educated people have a negative attitude against development and precedence of the economy. They have an uneasiness and a feeling of damage about the environment. They are also highly concerned about pollution and intend to do more about it than the uneducated people. Cause and effect are difficult to analyze, because they are related. This study had too few questions and gave insufficient data to deeply examine the relationship of pollution knowledge with social attitude.

**29141** **APTIC NO. 50545**

Sekiguchi, Takeshi

PERCEPTION OF AIR POLLUTION. *(Taikiosen no pasepushon). Text in Japanese. Preprint, Japan Architectural Inst., Tokyo, p. 85-102, 1973. (Presented at the Symposium on the Urban Construction and Weather, 3rd, Tokyo, Japan, March 9-10, 1973.)*

The perception of air pollution is discussed. Perception depends on physical and social factors which do not necessarily coincide. A perception survey in Great Britain showed 22% answered that there was air pollution in Exeter where the winter smoke concentration was 40 micrograms/cu m, 25% at Sheffield with 120 micrograms/cu m, and 53% at Edinburgh with 120 micrograms/cu m. The comparatively low awareness by the Sheffield residents of their local pollution was due to the propaganda of municipal authorities to the effect that air pollution problems had been solved. They claimed Sheffield was the cleanest city in Europe. Higher educated or higher social class persons felt air pollution was less serious than lower class persons. Perception of air pollution was greatly affected by mass media. For effective enforcement of legal criteria, the public should be aware of the actual state of air pollution. A sample of the perception survey questionnaire is included.

## GENERAL

### 1973

**29142** **APTIC NO. 50867**

Hishida, Kazuo

INTRODUCTION TO AIR POLLUTION. *(Kogai gairon). Text in Japanese. PPM (Japan), 4(4):2-20, April 1973.*

Air pollution is discussed in general. Data on sulfur oxides, suspended particulates, dust fall, and nitrogen oxides in Japan are discussed. The automatic monitoring system for Japan, automobile exhaust pollution in terms of carbon monoxide pollution in Tokyo and photochemical smog, pollutant sources, toxic effects of pollution, and air pollution episodes are also mentioned. The effects of sulfur dioxide and fluorides on vegetation are outlined. Local and national programs and legislation for controlling air pollution are reviewed. Desulfurization of fuels oils and other control methods are briefly mentioned. Enforcement of legislation and monitoring systems are discussed.

**29143** **APTIC NO. 50478**

Maurer, Siegfried

MANKIND MUST OVERCOME EVER NEW BARRIERS TO LIVE. *(Die Menschheit muss immer neue Schranken ueberwinden, um zu leben). Text in German. VDI (Ver. Deut. Ingr.) Z. (Duesseldorf), 115(2):100-105, Feb. 1973. 9 refs.*

The increasing concentration of carbon dioxide in the atmosphere causes great concern since the carbon dioxide cycle is disturbed when not all the CO2 produced by human activities is dissociated by plants to carbohydrates in the presence of water. The carbon dioxide concentration of the atmosphere, therefore, increases at a rate of 0.2%/yr. This increasing CO2 concentration could put a limit on the use of conventional combustion processes. But there are already signs that this limit will be circumvented by producing the required power in fusion reactors. This type of combustion will be also used for automobiles. It produces no CO2 or other pollutants. The DDT pollution of the environment is discussed. A small insect called Cellembola has been discovered which converts the DDT into less toxic components.

### 1972

**29144** **APTIC NO. 50748**

Japan Environmental Agency

PRESENT STATE OF AIR POLLUTION COUNTERMEASURES. *In: Quality of the Environment in Japan. 1972 Chapt. 1, p. 54-80.*

Although air pollution in Japan, with the exception of nitrogen oxides, has generally abated, it is still a severe problem. There are 40 cities which do not meet the environmental standard for sulfur oxides; they comprise a little less than 40% of the 110 cities with monitoring stations. The air pollution problem in local districts has recently become aggravated by the increases in such hazardous pollutants as hydrogen fluoride, chlorine, hydrogen chloride, and oxidants. The primary cause is a sharp increase in energy consumption. Air quality with respect to SOx suspended particulates, NOx, carbon monoxide, oxidants, and hydrocarbons are discussed. Environmental and emission standards and air pollution control measures are reviewed.

**29145** **APTIC NO. 50508**

Boehlen, B.

THE IMPORTANCE OF MAINTENANCE OF CLEAN AIR FOR ECONOMY AND THE GENERAL PUBLIC. *(Die Bedeutung der Luftreinhaltung fuer die Wirtschaft und Allgemeinheit). Text in German. Preprint, Eidgenoessische Amt fuer Umweltschutz, Bern (Switzerland), 12p., 1972. 2 refs. (Presented at the Herbsttagung der vierschweizerischen Textil-Fachorganisationen SVF, SVCC, VET, and VST, Baden, West Germany, Oct. 28, 1972.)*

In Switzerland a number of regulations concerning air pollution exist on a national, local, and city level. Many of the regulations and measures proved to be insufficient because they are too specific and lack a basis for coordination. For instance, the problem of curbing the emissions from automobiles is regulated by the traffic law, the reduction of lead emissions by the food law. None of the measures to date were preventive or tuned to the rising air pollution. The number of cars, for instance was allowed to grow enormously without simultaneous efforts to reduce the exhaust gas. In Switzerland no emission inventories are in existence yet. A complete prevention of any kind of air pollution is hardly feasible. The aim of emission protection should be the limitation of air pollutants to the absolutely unavoidable. The measures which should be taken against air pollution include the use of low-emission crude material and fuel, the application of low-emission production processes or the improvement of existing ones, the cleaning of unavoidable waste gases by cleaning systems, and the release of waste gases via high stacks.

**29146** **APTIC NO. 50706**

Lucas, D. H.

PROGRESS IN CLEAN AIR. *Clean Air, 6(4):66-69, Nov. 1972. (Presented at the International Clean Air Conference, Melbourne, Australia, May 1972.)*

Social, technical, and political progress in control of air pollution are discussed. The air pollution problems from the combustion of fuel in power stations, domestic fires, and motor cars are presented. Intensive studies have been carried out for the thermal rise of plumes and their dispersion in the atmosphere for large power station emissions. The results have been related with very thorough measurements to the ground level concentrations measured under different conditions. The emission of particulates from large stations has been studied in detail and it is recognized that the amount of particulates in flue gases and the rate of deposition are so great compared with gases that tall chimneys alone are not adequate and must be supplemented by removal processes with efficiencies up to 99%. The chemical reactions which sulfur dioxide may undergo in the atmosphere are being studied. High concentrations of sulfur dioxide harm plants, but sulfur is essential to plants. Specifications of air quality criteria and their understanding are discussed.

## 1971

**29147** **APTIC NO. 50788**

Patterson, C.

**ENVIRONMENTAL LEAD POLLUTION.** *(Zagryaznenie vneshnei sredy svintsom). Hyg. Sanit. (English translation from Russian of: Gigiena i Sanit.), 36(11):276-282, 1971. 14 refs.*

Natural and industrial lead pollution of the environment is discussed. The natural levels of lead in different parts of the biosphere are still unknown. However, considering the calcium: barium ratio, it may be assumed by analogy that the Ca:Pb ratio is 2000 in soil, 12,000 in uncontaminated plants, and probably 500,000 in mammals. The buildup of lead in living organisms and its effects are reviewed. The industrial use of lead throughout history is reviewed. Studies are cited of the accumulation of lead in oceanic sediments. In the prehistoric period all the oceans in the northern hemisphere received 11,000 tons of dissolved lead annually; present-day annual influx of dissolved lead is about 430,000 tons. The detrimental health effects of industrial lead are discussed, and investigations of the biochemical properties of industrial lead are reviewed also.

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